ECHNOLOGY DEPARTMENT

The CHEMICAL AGE

- LIX 23 OCTOBER 1948 No 1528

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1st to handle an efficient domestic distribution of their products
2nd to promote the exportation of their products.

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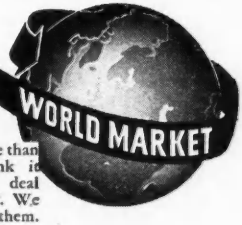

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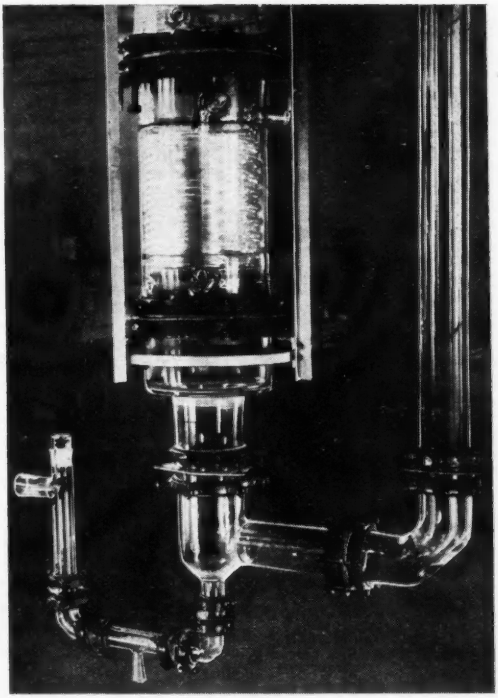

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The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers Limited

VOL. LIX No. 1528. — 23 October 1948 — Annual Subscription 26s. 8d. per copy, post paid, 10d.

Direction of Research

BETWEEN the viewpoints and mental processes of a Cabinet Minister and those of a research scientist stands a great gulf. Some incompatability is not surprising. When, however, the Cabinet Minister—in this case Mr. Herbert Morrison—presents himself in the guise of champion, patron and collaborator of research scientists few can be entirely unaware of the inherent oddity of this comparatively new state of affairs. This was forcibly emphasised once more on October 22 when Mr. Morrison, exercising his functions as Lord President of the Council, assumed the attributes of herald of new research endeavour and recorder of what have lately been the rewards. This was before the meeting in London of chairmen of councils and directors of the industrial co-operative research associations.

Mr. Morrison, however limited his sympathies in many other directions, is a firm believer in research, not perhaps on precisely the grounds that a scientist might advance in its support, but because, he says, he is convinced that it pays dividends. The fact that it confers a host of other gifts of a less immediate and tangible kind is unlikely to appeal half as strongly to him; and as he is the Minister who is responsible to Parliament for the distribution of grants to research associations the need for the continued stimulation of disinterested research by " neutral " interests need not be underlined.

That might appear an ungenerous conclusion in the light of some of the evidence of comparative munificence towards research of the practical sort with which Mr. Morrison encouraged his hearers on Friday. He said:

" While it has long been Government policy to encourage the establishment of research associations, it was only when I last met you three years ago that you first had an assurance that Government support would not be withdrawn from you after an initial stage but would be a continuing affair. On this assurance many of you have been able to develop in a big way. In 1938 the total expenditure of research associations was £470,000. Last year it was close on £2 million, and the total estimated for next year is £2½ million. That does not frighten me—so long as the cost of research more than earns its keep. Even allowing for the general rise in costs the effort has more than doubled and the number of research associations has almost doubled also, from 21 in 1938 to 38 now, with others coming along shortly."

That the kind of research in which the Government interest principally lies is handsomely " earning its keep " was acknowledged by Mr. Morrison himself, citing examples such as the continuous

On Other Pages

firing process in the pottery industry, which had reduced from eight to two days the time required in the kiln, the development by the British Cast Iron Research Association of high strength nodular cast iron, and some of the great economies derived from the studies by various sections of the Department of Scientific and Industrial Research. It is significant that, of the wide-ranging work performed by the DSIR, Mr. Morrison chose his examples from the spheres of lighting, housing and road research.

The quick profit motive was the subsidiary theme of much else that the Lord President found to say on the purpose and direction of future research, and, although he may be prone to regard science in general as a glorified aid to workshop efficiency, he is wholly in favour of the scientific "foremen" receiving the rate for the job.

"So far from research being an unproductive overhead," he said, "we can see the time coming when scientific research—provided we are active in using the results and that the subjects of research are rightly chosen—will be recognised as the most central and vital of all the processes of production. Research workers, therefore, must have the resources and status which they need to keep up this flow and I am glad to know that the status and conditions of British scientific workers have been, and are being, very much improved."

Nearly all Mr. Morrison's observations helped to confirm the Government's readiness to make room for the scientist, which has been most apparent during and since the war. In that respect the Government seems to have shown more farsightedness than some sections of industry. Speaking at the dinner of the Association of British Chemical Manufacturers two days before, Sir Ian Heilbron, president of the Chemical Society, declared there were still too many individual films which denied to the scientist any effective voice in the formulation of policy. Was it not reasonable, he asked, that the scientist, with his intimate and specialised knowledge, should be allowed to take his place on the management board on an equal footing with directors selected for qualifications apart from science? Their inclusion, he predicted, would remedy "a certain vacillating policy with which we are all too familiar."

The readiness shown by Mr. Morrison and some of his colleagues ultimately to admit scientists to "a place on the board" may also in the long run determine the success of the Government's own liaison with science.

NOTES AND COMMENTS

" Ordeal by Working Party "

THE frankness and informality with which Mr. Harold Wilson defended Board of Trade policy towards the chemical industry before several hundred well-informed critics at last week's annual dinner in London of the Association of British Chemical Manufacturers were extremely disarming. The head of the Board of Trade revealed himself as " a son of the chemical industry " and " virtually a by-product of the TNT industry," a reference to his father's activities as a chemical manufacturer in Huddersfield before and during the 1914 war. That reminiscence could be taken, as he suggested, as evidence that he is acquainted with the problems of industrial chemistry from the producer's standpoint and the good relations between the department and the association, which both generously acknowledged during the speeches, no doubt owe a good deal to his practical background. That is a gift unfortunately not generally shared by his colleagues in other Government departments with which the industry has to negotiate. Less reassuring were Mr. Wilson's pronouncements about the future of controls : of steel, he maintained with a good deal of logic that the present irksome delays—to which the ABCM chairman, Sir Harry Jephcott, among others, called his attention—might be a good deal worse under " free-for-all " conditions. Perhaps to soften the effect of this cold comfort, he held out the prospect of withdrawing " several other controls " of direct interest to chemical industry and congratulated the industry on not having been subjected " to ordeal by working party."

Defence of Steel

THE imminence of the danger of nationalisation of the steel industry was recognised, amply if rather belatedly, in many quarters this week. Mr. Eden, speaking at Warwick, referred to the ever-increasing output figures, the lack of enthusiasm for nationalisation on part of the men, and the absence for more than a generation of any industrial dispute. The national Press, too, has this week done more than any other agency to expose how irrational is the " case " propounded by those who are determined to place steel under the domination of Whitehall. Of these exposures, the special supplement on Monday with which the *Financial Times* made intelligible to all how valuable and highly integrated is the structure which it is proposed to scrap, and the special article by J. C. Johnstone in the *Daily Telegraph* on Tuesday, " The Steel Industry Has Spiked Nationalisation's Guns," were impressive contributions. As though preparing for the inevitable, the Sheepbridge Coal & Iron Co. announced a far-reaching scheme for segregating its assets into those which would probably be taken over in the event of nationalisation and those likely to remain in private ownership. Meanwhile, the organisers of the Steel Defence Campaign from their office at 5 Queen Anne's Gate, Westminster, S.W.1, are ready to launch an intensive plan throughout the country. Mr. Alfred Edwards, M.P., on his return from America, will carry out a personal tour, addressing mass meetings, a book on the importance and efficiency of the industry is in active preparation, and a film will also be released shortly. The only obvious criticism of these latter measures is that their prospects of success would have been very much better had they not been deferred until the eleventh hour.

The Rare Reward

BEHIND the widespread publicity given to the confirmation that a high percentage of uranium exists in the new green mineral, to be known as Sengierite, which Dr. K. G. Schuilling of the French Union Minière and Dr. Anton Gray of the Kennecott Corporation, isolated recently in mines in the Belgian Congo (THE CHEMICAL AGE, October 16) lies a hint of the dramatic value which now and again relieves the comparative monotony of a scientist's routine work in the laboratory. Said Prof. Paul F. Kerr, of America's Columbia University, to whom fell the distinction of revealing the great potential value of the small green crystals found clinging to chlorite-talc rock : " When you discover a new mineral, you never know whether that's the last of it. It's like a new baby—you hope he will amount to something, but you can't tell." That enshrines the philosophic outlook, which

invites no credit for the many tests that have to be carried out (in this case the new mineral was compared with 53 other hydrous uranium minerals) and which generally lead to nothing. For once satisfaction in establishing a new identification has richly compensated for the many hours of patient study.

Divided Allegiance

ONLY the uncharitable or the short-sighted can withhold good wishes for the success of the joint committee of the National Coal Board and the National Union of Mineworkers which has been meeting daily this week in an attempt to find cures for most of the ills which have enervated the campaign to secure a much more adequate yield of coal from the mines ("Notes and Comments," October 16). The objectives are in effect to safeguard the supply of one of the fundamentals of production of nearly every industry, and particularly of chemicals, and the addition of Sir Donald Fergusson, permanent secretary of the Ministry of Fuel, as an impartial chairman helps to generate confidence in the emergence of some tangible results. It is almost impossible, however, to be oblivious of the fact that this jury, drawn from the miners' union and what is now "the employers' side," is not manifestly an impartial one, and it is not even certain that all its members are in favour of what is in view. That impression was heavily underlined during the committee's first meetings at the latter end of last week by the grotesque circumstance that one of the key members, the NUM general secretary, Mr. Arthur Horner, was missing, having chosen instead to attend in Paris the congress of the Communist CGT to assure French miners of the support of English miners in maintaining the strike which is crippling France's economy. Whether he was justified in giving any such pledge is less important in the present connection than the fresh evidence that some of those who now exercise a decisive influence on the conduct of great industries are—to put it mildly—not entirely devoted to the cause of raising production.

Helicopter Spraying

Trials in Egypt

FIRST experiments in the use of helicopter for crop spraying are now being tried out in Egypt, near Turabi, in the Blue Nile province, on cotton land belonging to the Sudan Plantations Syndicate.

The aircraft, called a "spraycopter," is a British built Westland Sikorsky S.51, fitted with a spraying gear designed by Pest Control, Ltd., the insecticide being used is Psylortox.

Advantages of helicopter spraying are speed and ability to get close to the crops without damaging them. Another important factor is that the slip-stream of the rotor sends down a bell-shaped current of spray-laden air which coats the upper surfaces of the crops on its way down, rebounds from the ground, and thus enables the insecticide to reach the vertical and under surfaces.

British farmers have shown great interest in the idea, and Pest Control has ordered a fleet of helicopters for use in England next year. By use of these in Africa during the English slack season overhead costs can be lowered sufficiently to make air spraying only slightly more than spraying with ground equipment.

D-D as Soil Fumigant

Results of Shell Research

THE results of D-D in soil fumigation were demonstrated at a Press conference held at Shell Mex House on Wednesday, last week.

Shell D-D (dichloropropane-dichloropropylene) first aroused interest in America in 1942. Dr. Walter Crane, of the Pineapple Research Institute of Hawaii, seeking a remedy for the destruction of the pineapple crop by eelworm, obtained a derivative of petroleum—a dark liquid mixture of unsaturated chlorinated compounds—from Shell Chemical Corporation.

This mixture possessed extremely toxic properties as a fumigant and experiments were conducted against soil-borne pests. Research in this country was delayed by the war, but serious trials began here about two years ago.

Shell Chemicals are, however, now able to market D-D as an efficient soil fumigant giving full control of root-knot eelworm (*H. Marioni*). Shell research technicians are still carrying out trials, and there are many indications that D-D is effective against other soil pests and against some fungi.

New CB Process

Phillips Petroleum's English Patent

THE Phillips Petroleum Co. Delaware, U.S.A., are recorded as the proprietors of English patent No. 607,296 (Application 19880/45). This relates to production of carbon black by incomplete combustion of hydrocarbons, and more particularly to a continuous method of air cooling the hot gases containing carbon black The heat liberated from a portion of the gas is used in thermal decomposition of the remainder.

The carbon black particles formed are separated by (1) impinging on cool metallic surfaces and removed by scraping; (2) electrostatic precipitation, filtering, etc. In the latter case some preliminary cooling is required, best done by means of atmospheric cooling in the way described, instead of by direct water quench.

Several advantages are claimed for air cooling, including improved quality of product, reduced volume of gas to be processed

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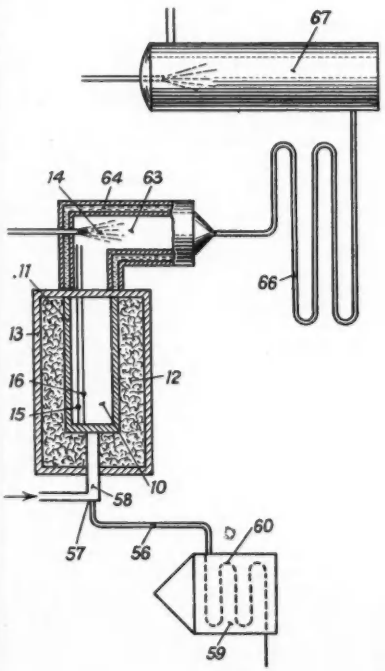

in carbon recovery equipment, and saving of water.

These advantages hitherto have been counterbalanced by inconvenience of progressive deposition of carbon, which has to be removed, *e.g.*, as described in U.S. Pat. No. 2,143,770. In the present invention such deposition of carbon is avoided by limiting the temperature at which gases are admitted to the air-cooling pipe.

In the accompanying figure the oil is preheated in coil 60 of preheater furnace 59, and is introduced as vapour into reactor 10 through pipe inlet 56. The reactor has a steel shell 13, with sillimanite lining 11, and insulation 12. Air enters reactor through tangential ports 15 and 16; a small amount of air also enters through inlets 57 between pipe 56 and larger pipe 58 concentric with it. The effluent from the reactor is given a controlled quench by spray 14 in primary quencher 63 covered by water jacket 64. It then passes through air-pipe 66 and secondary quencher 67 (this latter is not an essential part), and finally into a bag- filter or Cottrell precipitator.

Another Carbon Black Plant

ECA Approves Merseyside Project

THE second large-scale project to employ American carbon black technology to establish industrial undertakings in this country and the first guaranteed U.S. investment under ERP was announced at the end of last week by the Minister in charge of the Economic-Co-operation Administration to the United Kingdom, Mr. T. K. Finletter.

The proposal, which was stated to have had the approval of H.M. Government and the ECA in Washington, has in view the establishing on Merseyside, almost immediately, of a plant to produce 8-10,000 tons of carbon black annually.

The U.S. contractor is officially stated to be Godfrey L. Cabot, Inc., of Boston, Massachusetts, which has been established in the U.S. carbon black industry for some 40 years. It will make available full technology for design, construction and operation of the plant, which will be operated by the Cabot Carbon Company, Ltd.

Half the capital will be provided by Godfrey L. Cabot, Inc., and half by British sources. It is understood that the total capital will be in the region of £4 million.

On the basis of an annual production of about 10,000 tons of carbon black, the undertaking would be capable of reducing this country's dollar expenditure by £3-4 million a year.

New Fellows and Associates of the RIC

Results of the September Examinations

THE Royal Institute of Chemistry announces that the following were successful in the September examinations, 1948, for Associateship in General Chemistry or for Fellowships.

Associateships

ALLEN, Wilfred Kenneth, College of Technology, Rugby; ASHMEAD, Vincent William Joseph, Central Technical College, Birmingham; BAKER, Peter Reginald Walter, Woolwich Polytechnic; BALLINGER, Philip John, Merchant Venturers' Technical College, Bristol; BOHL, Eric James, City Technical College, Liverpool; BRIGGS, James Anthony, Technical College, Derby; CAPPER, Thomas, City Technical College, Liverpool; CLEMENTS, Henry, City Technical College, Liverpool; DAVIES, Roy Trevor, B.Sc. (Lond.), The Polytechnic, Regent Street, London; DICKINSON, Derek William, Technical College, Coventry; DIXON, Miss Jean Pickering, City Technical College, Liverpool; FIELD, Dennis Ronald, Technical College, Coventry; GOW, Robert John, Technical College, Widnes; GREEN, Maurice Speakman, B.Sc. (Lond.), Royal Technical College, Salford, and Harris Institute, Preston; GUMMER, Peter Edward, Imperial College and The Polytechnic, Regent Street, London; HODGES, Eric, Technical College, Coventry; HOLBROOK, Allan, Royal Technical College, Salford; HOLLAND, Geoffrey James, Technical College, Coventry; HULLAH, Miss Jean Irene, Technical College, Lancaster, and Harris Institute, Preston; JEFFERSON, Frank, Municipal Technical College, Hull, and Technical College, Bradford; JELLY, Lawrence Grenville, Technical College, Coventry; JOHNSON, Ronald William, Acton Technical College, London; KIRBY, Norman, Municipal Technical College, Hull; LUGGAR, Geoffrey Keith, Central Technical College, Birmingham, and Technical College, Coventry; MARTIN, Leslie Edwin, College of Technology, Manchester, Technical College, Cardiff, and Royal Technical College, Salford; MCGINN, Colin James Patrick, B.Sc. (Lond.), Northern Polytechnic and Sir John Cass Technical Institute, London; MCLELLAN, James Kidd, M.A., B.Sc. (Glasgow), University and Royal Technical College, Glasgow; MITCHELL, Thomas Allen, City Technical College, Liverpool; MOCKRIDGE, John, Royal Technical College, Salford, and Chelsea Polytechnic, London; MORRELL, Norman, College of Technology, Leeds; MULLIN, John, Technical College, Paisley; PARKER, Harry Lionel, Technical College, Derby; PEARCY, Victor Joseph, Municipal College, Portsmouth; PRIESTLEY, Edgar, Technical College, Huddersfield; REES, Philip Owen, Technical College, Cardiff; ROGERS, Miss Elsie, Technical College, Coventry; SEPHTON, Douglas Peter, Medway Technical College, Gillingham; SHELTON, James Harry, South-West Essex Technical College, Walthamstow; SIMPSON, William, Royal Technical College, Glasgow; SMITH, John William, Battersea Polytechnic, London; THOMAS, Howard, B.Sc. (Lond.), Technical College, Bradford; THORP, Alan, College of Technology, Manchester, and Royal Technical College, Salford; TUNSTALL, Geoffrey, City Technical College, Liverpool; TURNBULL, William Briggs, Constantine Technical College, Middlesbrough, and Technical College, Sunderland; VINES, Gordon David, University College, Leicester; WHITE, Peter Thomas, University College, Leicester; WILKIE, Alan George, Technical College, Bradford; WILSON, Hugh Arthur Baird, B.Sc. (Lond.), Royal Technical College, Glasgow, and Technical College, Paisley; WILSON, Raymond Ernest, B.Sc. (Lond.), Harris Institute, Preston; WOOD, Charles William, B.Sc. (Lond.), College of Technology, Leeds; WOOLER, Alan Metcalf, College of Technology, Manchester, and Royal Technical College, Salford; WORRALL, Edgar John, City Technical College, Liverpool.

Fellowships

Branch C, Organic Chemistry: CASSON, Frank David, B.Sc. (Lond.); GREENHALGH, Norman, B.Sc. (Lond.); PARKER, Donald, B.Sc. (Lond.).

Branch C, Organic Chemistry, with special reference to high polymers: JOHNSON, Alfred Sydney, B.Sc. (Lond.); RAY, Stanley, Arthur, B.Sc. (Lond.).

Branch C, Organic Chemistry, with special reference to oils, fats and waxes: SAUNDERS, Aubrey, B.Sc. (Lond.).

Branch E, The Chemistry, including microscopy, of food and drugs and of water: KULANAYAGAM, Vallipuram; SUFRIN, Reuben, B.S. (Lond.); THACKRAY, Gerald Bowling, B.Sc. (Lond.); WATSON, Robert Sinclair.

Branch H, General Analytical Chemistry: GLOVER, Jack Harry, B.Sc. (Lond.); HAMLIN, Anthony George, B.Sc. (Lond.).

Special Examination in Pharmaceutical Analysis: GILLHAM, Ronald William.

Costly Ammonia Recovery

Six-fold Increase in Glasgow Tender

THE phenomenal rise in costs of materials and constructional work was referred to when the Glasgow Corporation Gas Committee considered the plans for the extension of the sulphate of ammonia plant at Provan chemical works. The scheme before the war was originally estimated at a cost of £1800 and it was anticipated that the current price might be in the region of £5000, but when tenders were submitted the price proved to be £10,600.

This sum was considered excessive by the committee and the matter was referred to the Ministry of Fuel and Power, which ruled that, as tenders had been invited, the lowest offer must be accepted.

It was pointed out that this "enormous" expenditure would be added to £21,000 spent on an ammonia plant, which it was alleged had never worked, and it was even doubted by one member if this additional outlay would make the plant operative.

The purifier plant, it was explained, was for the existing system not for the new Provan chemical works plant. It was claimed that disposal of sulphate of ammonia from municipal gas plants had never paid, but the work had to be carried on as an adjunct to gas manufacture.

The expenditure was finally approved by a majority vote.

VERSATILE PLASTICS

SYNTHETIC boards, plastic laminates, and resin-bonded materials form the basis of the exhibits now on view at Murray House Exhibition Hall, London, S.W.1. Organised by the Council of Industrial Design the idea is to show what can be done with these materials.

Office and domestic furniture made from plastic board are to be seen, also a miner's helmet showing the use of laminated paper made from cotton rags. Of considerable interest is the test model of a Handley-Page Hermes V, made from Fibrenyle, an alternative to steel, which is produced in the form of a dough consisting of vegetable or mineral fibres mixed with plastic resins.

ECA Purchases Approved.—Purchases by Britain to the value of $44½ million were approved by the U.S. Economic Co-operation Administration on October 14. These included petroleum products from Arabia and Saudi Arabia, carbon black from the U.S. and lumber and saw-mill products from the U.S. and Canada.

Research in the W. Indies

Industrial and Agricultural Projects

EXPENDITURE totalling over £580,000, under the Colonial Development and Welfare Acts was approved for research schemes in the West Indies in the year ending March 31, 1948. The largest grant was one of £165,000 for a ten year programme of soil research.

Important developments towards establishing industries based on sugar, have been made in the manufacture from sugar of substitutes for blood plasma and glucose. These discoveries have resulted from work being carried out in the United Kingdom, in which the Colonial Products Research Council is interested. A research unit in sugar technology is to be set up at the Imperial College of Tropical Agriculture, where carbohydrate derivatives from sugar have been prepared with analgesic, local anæsthetic and toxic properties, and one has been selected for clinical trial of its analgesic value.

Microbiology

The official opening of the Colonial Microbiological Research Institute has made Trinidad a Commonwealth centre for microbiological research.

In agriculture, the Imperial College of Tropical Agriculture has had affiliated to it three schemes which will benefit the West Indies as a whole; these are a soils research scheme, a banana research scheme, and a cocoa research programme.

The desirability of investigating the mineral resources of the West Indies, as well as volcanic phenomena, water supplies, etc., was considered when Dr. F. Dixey, director of geological surveys visited Jamaica, British Honduras, Trinidad, British Guiana and St. Lucia.

(*Commonwealth Survey*, No. 8, October 2, 1948).

Aluminium Prices Increased

The British Aluminium Co., Ltd., has announced that, in view of the increased prices for virgin aluminium announced by the Ministry of Supply (THE CHEMICAL AGE, October 16), its prices for raw and fabricated aluminium products have had to be adjusted. The new raw material prices reflect the increases in the price of aluminium and other metals used for alloying. The new prices for fabricated products have also taken partially into account the effect of recent wage awards, the overall result being, in general, an increase of 1d. per lb. The new prices apply to all orders accepted on or after October 11 and later will refer to all deliveries.

Mr. Harold Wilson (President of the Board of Trade) with Sir Frederick Bain (right), vice-chairman of the Association of British Chemical Manufacturers, at the reception preceding the association's annual dinner in London last week

PRODUCTION HINGES ON PLANT AND EQUIPMENT

The ABCM States its Case

ALL departments of chemical industry were more fully represented than they have been on any post-war occasion when the Association of British Chemical Manufacturers held its annual dinner on October 13 at Grosvenor House, London, W.1. The occasion was distinguished by the presence among the long list of guests, to whom the association chairman, Sir Harry Jephcott, acted as host, of the President of the Board of Trade, Mr. Harold Wilson, and prominent figures in the academic, research and administrative spheres. The speeches accordingly presented a very representative symposium of recent development of industrial chemistry, the universities, research and the relationship between industry and the Government.

Sir Harry Jephcott, proposing the toast of "The Guests," observed that the principal guest, the President of the Board of Trade, had told him of his desire to know more about the chemical industry. In his following remarks the speaker gave an able review of the scope of the present-day industry and of some of its more urgent problems.

The chemical industry was not easy to define, he said, and there were in existence several different definitions, as became apparent if one consulted official regulations.

One could approach this problem of definition from the standpoint of the textbooks and say that if, as a result of an industrial process, chemical change as distinct from merely physical alteration has taken place, then that process falls within the chemical industry. Such a definition would be very wide. It would extend from the manufacture of rayon to the carbonisation of coal and might even be held to include the human digestive processes.

The primary products of the chemical industry left no doubt as to their character—the heavy chemicals, the tar products, the dyestuffs, the fine chemicals. These constituted the hardcore of the industry but, in addition, there were very closely allied manufactures of a less strictly chemical type, but which were commonly included within this industrial group, such as pest control products and pharmaceuticals.

Closely Integrated

At first sight there might be little connection between the manufacture of, say, sulphuric acid and a dyestuff or a pharmaceutical; yet, in practice, they were all interwoven, the products or by-products of one being the essential raw ingredients of another. There was great complexity within the industry and a high degree of interlocking and interdependence.

During the last war the industry had met all the demands which were put upon it. Now the chemical industry had very properly been called upon to pay its full share in the effort which the country is making to regain economic freedom.

It could fairly be claimed that the industry has not failed in its task. The total export of chemicals now stood at 155 per cent by volume as compared with 1938. This was no mean accomplishment when it was remembered that direct exports were not to be the first, but the last claim upon the industry.

Of the total chemical products sold at home, or exported, and estimated in 1947 to have a value of £233 million, almost 90 per cent was produced in this country or, excluding those chemicals which represent unavoidable imports, such as potassium

salts, no less than 93 per cent was manufactured within this country.

These great increases in productivity had not, however, resulted in any feeling of complacency. They were conscious of the competition from their colleagues across the Atlantic, but they suffered two handicaps—the first an inadequate supply of trained and practical men with a sound knowledge of chemistry and of chemical engineering, conscious of the urgency for developing pure research into industrial process.

An even greater difficulty related to physical facilities. Broadly, within the chemical industry productivity depended upon plant capacity. To overcharge plant was commonly to court disaster—to reduce output and efficiency, not to increase them. Increase in production rested upon the availability of plant and, by plant, was meant not merely the particular vessel, the still, the filter press, the centrifuge. It was no good providing plant, unless there were buildings to go with it. It was unfortunate that, for Government purposes, buildings were the responsibility of another Ministry. Those circumstances resulted in frequent and most serious delays.

Annoying Delays

Recently there had been the instance of a firm wishing to put up a pilot plant to try out a new process with tremendous potentialities. In spite of this, they had to wait 18 months for the few tons of steel required. That was only the beginning.

He could speak from personal experience of other kinds of delays. His company had required to use some rather large pipes which needed bending. The people who did that kind of work had notified them that nothing could be done in less than six months. The chemical industry was entitled to say: "Give us the plant and we will give you the output."

The speaker went on to acknowledge warmly the helpful reception which had always been extended to the association and to its members of their industry by the Civil Service, which, in countries overseas, was regarded with an admiration amounting almost to veneration. He himself had had from the Government departments nothing but fair deals and no favours.

Alert Ostrich

The scientific societies, of which many eminent members were also among their guests, were prone to regard the chemical industry as an ostrich, with its head in the sand, exposing part of its anatomy which had a fatal fascination for the academic boot. They did not mind the very gentlemanly kicks they administer; indeed, a few kicks might be good for them, but they did emphatically insist that, however ostrich-like the industry may appear, its head was not in the sand. Its head might be near the ground, but it was searching for those inconsiderable metallic trifles which had escaped the control nets of Government officials.

Whatever differences of opinion might exist between them as individuals, there was one matter upon which they were completely united. They would all do everything in their power to hasten the day when this country had gained its complete economic freedom and could stand among the nations, dependent upon none and co-operating with every nation of goodwill, for the betterment of all.

A Key Industry

Mr. Harold Wilson, President of the Board of Trade, responded for the guests, who, he said, were glad to render honour to the chemical industry, upon which nearly every industry in the country depended in some degree. His first meeting, within 24 hours of his appointment to the Board of Trade, had been with the chemical industry and with their association. His acquaintance with the problems of the industry,

At the chairman's table (from the left) Mr. R. Duncalfe, Mr. Harold Wilson, Sir Harry Jephcott and Sir Robert Robinson

particularly such matters as key industry duty, extended to a period very much earlier than his appointment at the Board of Trade. His father had been in the industry for close on 50 years.

The chemical industry, towards which, he was aware, the BoT bore a most important responsibility, was one of the industries playing a very important part in national recovery. A first charge on the industry had been to keep going essential supplies for home industries, but it had also made a great direct contribution to the export drive. Chemical exports had risen in value from £22.25 million in 1938, to an annual rate of £80 million in the first half of this year. In terms of volume, exports in the first half of 1948 were 52 per cent above the figure for 1938, and for July and August about 67 per cent above the 1938 figure. The value of chemicals exported in July-August was £7.3 million, which was approaching the end-1948 target of a little over £8 million a month.

Achieving Independence

They had to think also of the very great contribution the chemical industry was making to import saving, particularly in agriculture, through fertilisers and plant protection products.

There were in being many important projects which would eliminate large amounts of organic chemicals and plastic materials which have been imported from North America, including molasses, alcohols, solvents, and a wide range of oil derivatives, together with materials for the rapidly growing plastics industry. Expenditure has been in the region of $60-70 million a year, and this would in future be greatly reduced and, in the case of many products, eliminated.

In a period of necessarily severe restrictions of capital building, important dollar-saving chemical schemes had still gone on. The pace must, however, be dictated by the rate at which provision of plant and buildings could be made. The main difficulty was that the country's plant producing capacity was inadequate for demand on the present scale, and the chemical industry itself was never laid out on a scale to meet all the needs of this country in a period of post-war reconstruction.

At one time, he declared, it would have been possible to find engraved on his heart the words "soda ash." Now, soda ash was no longer a very scarce commodity, but it would take some years before the country's caustic soda production was adequate to meet all the demands being put upon it.

The chairman had spoken of the delays in getting licences for construction and the delays which occurred thereafter. That, he considered, demonstrated how valuable a licensing system was; without such a system the gap would be infinitely longer.

Necessarily, there had latterly been severe restriction of building, but the chemical industry had had a share greater than that of almost any other industry. New materials, ardil, terylene, polythene, synthetic detergents, had been developed, and rapid progress was being made in regaining the leeway lost during the war and in keeping pace with modern developments in the plastics industry.

Building plans in the industry amounted to well over £200 million by 1952—for expansion of production of alkalis, synthetic fibres, fertilisers, plastics, dyestuffs, carbon black, and a wide range of miscellaneous inorganic chemicals. Production of dyestuffs was already over 50 per cent above pre-war; plastics output was well over three times that of pre-war, and was to be increased still further in the next four years.

Some of these new plants were already nearing completion: when all were working the net result would be that, with a few exceptions, we should be self-supporting in the main items of chemical production, and in goods such as alkalis, dyestuffs, and phosphatic products we should have a substantially increased margin for export. There were also several major projects afoot, linked with the planned expansion of United Kingdom refinery capacity, for cracking oil for chemicals.

Aid to Europe

These developments, taken together, would represent a notable contribution to the solution of our own balance of payments difficulties within the next four years, and would enable us to reduce the dependence of other European countries on dollar imports. The chemicals development plan therefore formed an important item, along with the other major industrial development plans, in the four-year programme which H.M. Government had submitted to the Organisation for European Economic Recovery.

He cordially acknowledged the great help and co-operation all Government departments had received from the ABCM during and since the war, particularly in connection with the relaxing of controls. They were looking forward now to the prospect of removing several other controls.

Among other Government affairs of importance to the industry, the Monopolies Act contained one or two sections which, in his view, would be found to have applications to their industry. That would have to be further considered as the Act went forward. The industry had not been subjected to

"ordeal by working party" and he thought that, appropriate as it was to many other industries, it would not be possible to set up for the chemical industry a working party representative of both sides which would be competent to deal with all the complexities and ramifications of the industry.

The Government was particularly anxious to enlist their support in ensuring the future technical development of the industry, and as soon as its own tripartite plans were set up, it was hoped to go more closely into the subject with them.

The Scientists' View

The toast of "The Association" was proposed by Sir Ian Heilbron, president of the Chemical Society. He surveyed the extremely wide field in which the association had served the industry and the national interests and, as an academic scientist, he acknowledged the generosity of the association in placing a fund at the disposal of the Chemical Council for the publication of research memoirs. Without that the work could not have been carried on.

He questioned, however, whether all that was possible had been done to reach the goal the association had set itself. Ways might still be sought to ensure closer contact between individual firms and for pooling information of the sort which often was, in fact, an open secret. He had observed a welcome change of policy in many firms regarding the publication of scientific papers, but he still thought that this trend could go further, with advantage to the individual firm and to the community—the secrecy obsession dies hard.

"Relentless Control"

The President of the Board of Trade had told them how much higher production was than in 1938. The speaker was convinced, however, that higher goals would be reached. It was of first importance to apply what is already known, and it was here that the Government could do much to reduce the difficulties and frustrations which beset the chemical manufacturer. If we were to secure the advantages of time and opportunity which now present themselves, the Government should relax immediately its relentless control of all facilities for new development. The translation of an invention from the laboratory-bench to the small-scale development plant was an obvious prerequisite of production, but one which Government departments appeared to have considerable difficulty in appreciating.

Sir Henry Tizard's recent statement to the British Association should not be interpreted as meaning that we could allow research to take a second place. In chemistry there was no more dangerous attitude of mind.

The Universities were playing a worthy part in providing men of the calibre needed; he rejected entirely the contention that their syllabuses were too narrow. He was more disposed to question whether the industry always used these men to the best advantage. There were still too many individual firms which denied to the scientist any effective voice in the formulation of policy. Was it not reasonable that the scientist, with his intimate and specialised knowledge, should be allowed to take his place on the management board on an equal footing with directors selected for qualifications apart from science? Surely this could only result in providing a remedy to those vacillations of policy with which we are all too familiar.

A Proud Duty

Sir Frederick Bain, vice-chairman of the ABCM, to whose distinguished record in industry and industrial organisation Sir Ian Heilbron had referred, replied to the toast. He spoke appreciatively of the terms in which they had been addressed by the President of the Board of Trade and declared that if future approaches to the industry were made in the spirit in which Mr. Wilson had spoken they would be met by the same spirit.

They were conscious that the responsibility now resting upon chemical industry was greater than ever before. If they tackled present problems with vision and courage they would achieve something of which they could all be proud—by getting their country through her economic troubles by 1952.

Referring to less immediate problems, the speaker called attention to the effect of widened chemical knowledge and applied science in disturbing many factors which had traditionally affected the human race—in keeping so many people alive. Science had the great responsibility of determining how to make an adequate contribution to feeding all these rapidly increasing populations.

Chemical industry had been likened to an ostrich. The resemblance was, he thought, to quite a different bird—the stork.

[THE CHEMICAL AGE owes its apologies to the President of the Board of Trade for having accredited Sir Stafford Cripps to his office (THE CHEMICAL AGE, October 16). This was entirely unpremeditated—and without malice.]

U.S. Loan to Chilean Industry.—A cellulose factory to be constructed in Chile at a cost of U.S.$7.5 million will be financed by a loan repayable over 20 years.

ABCM's ANNUAL SURVEY

Industry's Export Target Almost Reached

AT the annual general meeting of the Association of British Chemical Manufacturers, held in London on October 14, the chairman, Sir Harry Jephcott, moving the adoption of the annual report and accounts, said the past year had been one of great activity due to the unprecedented economic difficulties with which the country had been faced.

The Eastern branch office, he said, was now firmly established and was doing good work. India and Pakistan were passing through a period of great political, administrative and economic stress and the full benefit of the Eastern branch office could only accrue in the longer term. He believed, however, that those who were supporting it were well satisfied with its work and would not fail to continue their support.

The Export Drive

During the past year, special urgency had been given by the Government to the export drive. The chemical industry might justly be proud of what it had achieved. Not only had it met most of the increased demands of the home consuming industries, especially of those which have themselves to provide much greater exports, but it had also augmented the country's direct exports of chemical products.

"We are well on the way to reaching the target set for the end of 1948 of £8.05 million per month," he said. "To some extent we have been handicapped by shortages of materials and to a small extent of labour, but our main difficulty has been the problem of obtaining authority for the new buildings and plant which are essential if production is to be further increased and the consuming industries assured of the chemical raw materials they require."

There was, however, continued the chairman, a ray of hope for the country's chemical industry in the future. Its vital importance as a supplier of essential raw materials to all other industries was at last being recognised by those in authority, and building licences were at last being granted over a wider field. But chemical factories could not be erected overnight and it would be many months, if not years, before they could meet the demands which might be made upon them, both for home and export.

The position as regards supplies of plant was a little easier. Urgent bottleneck cases had been successfully handled by a small informal panel, on which they gratefully acknowledged the willing help of the Board of Trade, the Ministry of Supply, and the British Chemical Plant Manufacturers' Association.

The position in respect of Germany had changed considerably in the past year, mainly because of the difficulties which had arisen with Britain's Eastern ally, the chairman observed. It had become more necessary than ever to re-establish a sound economy in the Western zones. That was likely to mean fewer reparations, but those were a doubtful asset in any case.

The mission which the Government finally allowed to visit Germany in connection with dyestuffs and pharmaceuticals had given them a clearer picture of future possibilities, while the new contacts established with the German Chemical Manufacturers' Association in the British zone afforded a direct channel for the discussion of the various problems that were bound to arise between their two industries in the next few years.

"We have many difficult problems ahead of us," he added. "We must build up and develop our industry so that in scope and efficiency it is second to none. There are still large imports of chemicals which we ought to be able to make here and to this we shall have to give special attention. Research work continues on a satisfactory scale, but development is unduly restricted by the limitations on capital expenditure imposed on us by Government policy. Given freedom from irksome restrictions, we are convinced of our ability to develop a still more flourishing and efficient chemical industry in this country."

Staff Loyalty

In conclusion, Sir Harry Jephcott thanked all members of the association, and in particular his colleagues on the council, for their loyal support throughout the year, and the past chairman, Mr. L. P. O'Brien, who had deputised during the chairman's absences abroad. He also recorded his appreciation of the loyalty and zeal of all members of the staff.

Among the items of interest in the annual report, it is pointed out that early in the year under review, the association's Group B, expecting an early inquiry into the future of the Key Industry Duties, arranged for the preparation of a booklet, "Fine Chemicals and the Nation's Future," designed to inform Members of Parliament, and those whose opinions might be of influence, on the nature and importance of the industry. The provision in the Spring Budget for the extension of the Key Industry Duties for a

further three years removed the immediate need for the booklet. Arrangements had been made for the text to be reviewed periodically ready for expeditious publication when the occasion arose.

The council also reported matters as follows:—

The 1948 Finance Act, while extending the life of the Key Industry Duties, throws the duties open to modification as the result of trade agreement negotiations with other countries. A satisfactory assurance was given by the Board of Trade that, as hitherto (notably in connection with the Geneva negotiations), the association would be consulted when any such modification was proposed.

The group's statistical scheme continues in its simplified post-war form for the collection of quantitative data on the production of each fine chemical made by members.

Arrangements were made for an intensive study, in consultation with members, of the imports of K.I.D. chemicals during 1947, with a view to ensuring that the industry would itself produce as many as possible of the fine chemicals which are at present being imported.

In parallel with the survey of the 1947 imports of K.I.D. chemicals, the council decided that a similar investigation should be made into the possibilities of reducing the volume of imports of general chemicals. This is now in hand.

German Chemicals

The revised plan for the level of post-war German industry in the Anglo-American zone of Germany was published on August 30, 1947. The chemical production was to be allowed to attain practically the 1936 level, although this was not expected until 1950 or later. As total exports were to be increased to 15 per cent above 1936, in order to pay for imports, it was obvious that chemicals would have to form a considerable proportion of the total. One of the main objects of these decisions was to settle finally the plants to be declared surplus for reparation purposes. Unfortunately, the failure to reach agreement on reparations by the four Powers in Berlin has delayed allocations to the western countries and many plants which have actually been dismantled in the British zone are simple rusting away on the site owing to the refusal of the British Government to proceed with allocations except by a four-power agreement.

In spite of the time devoted to this matter by the association staff during the last two years and help given to the Government by members in providing technical representatives to inspect German plant, the paucity of progress has confirmed the view expressed last year that the benefit to British chemical industry from reparations will be negligible.

A list of 38 gases and vapours, for which tests suitable for use under works conditions are considered necessary, has been drawn up and submitted to the Chief Inspector of Factories with the request that the work should be undertaken by the Government on behalf of the Government departments concerned and industry as a whole. Full technical co-operation will be given by members. Nine more products have been listed where further physiological information is needed to decide the nature of the test required and a further eight will be watched for possible future developments in industrial use.

Membership and Officers

On May 31, the conclusion of the year, there were 206 members of the association. Six new members joined during the year: one, a subsidiary company no longer making chemicals, resigned.

The constitution of the council over the ensuing year was stated to be as follows:—

President: Dr. P. C. C. Isherwood, O.B.E.
Vice-Presidents: Dr. F. H. Carr, C.B.E.; Mr. R. Duncalfe; Dr. E. V. Evans, O.B.E.; Mr. C. A. Hill; Mr. C. F. Merriam; Mr. L. P. O'Brien; Mr. R. G. Perry, C.B.E.; Mr. C. V. Merriam will also act as an additional vice-chairman.
Elected Members: Chairman, Sir Harry Jephcott; Vice-Chairman, Sir Frderick Bain, M.C.; Honorary Treasurer, Mr. C. E. Carey; Mr. A. D. Dayah; Dr. A. E. Everest; Mr. C. G. Hayman; Mr. G. E. Howard; Mr. W. F. Lutyens; Mr. L. G. Matthews; Mr. T. D. Morson; Mr. D. P. C. Neave; Mr. F. G. Pentecost; Mr. S. W. Whiffen; Mr. G. F. Williams; Mr. K. H. Wilson; Mr. H. Yeoman.
Co-opted Members: Mr. B. A. Bull; Mr. I. V. L. Fergusson; Mr. W. K. Hutchison; Mr. Derek Spence.
Honorary Vice-Presidents: Mr. N. N. Holden; Lord McGowan.
Director and Secretary: Mr. J. Davidson Pratt, C.B.E.
Joint Managers: Mr. R. M. Drake; Mr. A. J. Holden, B.Sc.

New Hungarian Association

Hungarian scientific and technical societies have recently formed the Association of Hungarian Societies for Technics and Natural Sciences. It aims at the unification and rationalisation of research work, the organisation of documentation, the establishment of a central publishing house for professional periodicals, etc. The new association intends to maintain contact with foreign scientific associations and plans to acquaint Hungarian scientists with the results of research work abroad. Results of Hungarian scientific research are to be made known to foreign scientists at the same time. The new association's address is Szalay-utca 4, Budapest, Hungary.

Chemistry of Radioactive Substances

The New Factor in Science and Industry

(From a Special Correspondent)

RECOGNISING how rapidly and widely the development of radioactivity are likely to affect industrial and scientific processes, the Oil and Colour Chemists' Association have sponsored the series of three lectures now being given by Prof. H. J. Emeléus summarising the fundamentals of the subject, the first of which was delivered in London recently.

The Beginnings

Prof. Emeléus opened with a general historical survey. Röntgen's observations in 1896 of the fluorescence of a barium platinocyanide screen when exposed to X-rays, started the particular train of work which led to the atomic bomb and the atomic pile, said Prof. Emeléus.

Becquerel carried these studies further by irradiating a uranium salt, wrapping in black paper and obtaining an image (through a perforated mask) on a photographic plate. But he found that he obtained the same result on a blank determination with the uranium salt. Thus, the radiations penetrating the black paper originated in the uranium itself.

Rutherford showed the radiation to consist of two parts; α rays of low penetration and high ionisation, β rays of great penetration and low ionisation. Then came the search for radioactive elements. Pitchblende was found by the Curies to have an activity greater than corresponded with its uranium content—the radiation being measured by the rate of discharge of an electroscope.

From the pitchblende group of minerals were isolated radium and polonium—both very active, actinium, radon and several others. Some appeared to have a constant rate of radiation, as, for example, uranium, but some appeared to decay quickly, for instance, radon. In 1903, Rutherford and Soddy had the idea of the decay series. The law $= I_o e^{\lambda t}$ was discovered (I being intensity at time t, I_o initial intensity, λ a constant); the nature of the different radiations α, β, γ was cleared up. It was realised that a loss of a β particle was equivalent to the gain of a positive charge and soon the various decay series were known.

Thus, the radium series consists of $U_1 \rightarrow$ Ra G (which is Pb^{206}), the thorium series ends in Pb^{208} and the actinium series goes to Pb^{207}. It was confirmed that these were all chemically identical, differing only in atomic weight. They were duly named isotopes.

In 1919, Rutherford achieved the artificial disintegration of nuclei by α-particle bombardment

$$N^{14}_{7} + He^{4}_{2} \rightarrow O^{17}_{8} + H^{1}_{1}$$

This was found to be possible for a range of light elements, excluding carbon and oxygen. The α particles, small, having high energy, occasionally hit a nucleus, producing disintegration. Now the physicists began bombardment with artificially accelerated particles, for instance, protons accelerated in a cyclotron. Thus Cockcroft and Walton in 1932 performed the reactions

$$Li^{7}_{3} + H^{1}_{1} = 2\ He^{4}_{2}$$

Chadwick in 1932

$$Be^{9}_{4} + He_{2} = C^{12}_{6} + n^{1}_{0} \text{ (a neutron).}$$

Discovery of artificially induced radioactivity by Curie and Joliot followed soon, in 1934

$$Al^{27}_{13} + He^{4}_{2} = Si^{30}_{14} + H^{1}_{1}$$

$$Al^{27}_{13} + He^{4}_{2} = P^{30}_{15} + n^{1}_{0}$$

followed by

$$P^{30}_{15} = Si^{30}_{14} + e+$$

Thus, if the aluminium after bombardment is dissolved in acid the gas evolved is radioactive, due to the active phosphorus in the phosphine.

Neutron Bombardment

Neutrons penetrate readily and are readily captured, since there is no charge and therefore no repulsion to overcome. Fermi found slow neutrons to be more readily captured than fast. An early discovered reaction was

$$Al^{27}_{13} + n^{1}_{0} \rightarrow Al^{28}_{13} \rightarrow Si^{28}_{14} + e-$$

By analogy to this Fermi tried to produce a heavier element from U but found in the product a number of activities due to fission to isotopes of Lanthanum, barium, krypton, etc. The total range of atomic masses was 72 to 162. Two massive fragments were found, several neutrons were emitted, matter was destroyed and appeared as energy. The nucleus derives an increase in energy on capturing the neutron and becomes unstable.

In the fission products are also masurium (element 43), element 61 in appreciable quantity and halogens (including element 85). They are all radioactive, usually β, and have series of changes down to a stable

end product. Thus, Sb^{133}_{51} goes via intermediate steps ultimately to Cs^{133}_{55}. 60 of these chains are known. The fragments initially have a mass greater than corresponds to the nuclear charge. By the loss of the β particles the latter is increased.

Unusual results have been obtained in California by a bombardment by deuterons with energies up to 2×10^8. This has produced e+ emitters

$$e.g.,\ Cu^{65} \rightarrow Fe^{52} \quad e+.\ 7.5\ h.$$

This type of break-up has been named spallation.

Transuranic Elements

Names, symbols and atomic numbers of the transuranic elements are as follows:—

Neptunium	NP	93
Plutonium	Pu	94
Americium	Am	95
Curium	Cm	96

First samples of plutonium were made in the cyclotron. (In the notation in brackets used below, the first symbol represents the bombarding particle, the second the emitted; d signifies deuteron, n neutron).

$$U^{238}_{92}\ (d; 2n) \rightarrow Np^{238}_{92} \rightarrow \beta \rightarrow Pu^{238}_{94} \xrightarrow{\alpha} U^{234}_{92}$$

In the pile

$$U^{238}_{92}\ (n; \gamma) \xrightarrow{\text{ultimately}} Pu^{239}_{94}$$

The new elements have provided a new radioactive decay series, the 4n + 1 series, which fills a gap in the known series 4n, 4n + 2 and 4n + 3. None of the members of this new series occurs in nature. The end product is Bi^{209}.

Electronic structure of the transuranic elements is analogous to that of the rare earth series. The "build-up" from one element to the next is by an increase in the number of electrons in the 5f shell, which is an inner shell, not in the outermost. Hence, in their chemical properties they are very similar to each other.

Most of them show a number of valencies. For instance, plutonium has valencies of 3, 4, (5), 6. Plutonium also forms the ion PuO_2++ isomorphous with UO_2++. The iodate Pu $(IO_3)_4$ is insoluble and is used in quantitative determinations of the element.

Despite all the present-day difficulties, concluded the lecturer, the discovery of atomic fission has been an outstanding achievement making available new sources of power and new special isotopes.

C

Utilising Atomic Energy

Fresh Estimates

THE progress in harnessing the power from atomic energy was the topic of recent speeches in America and England.

In Baltimore, Mr. David Poole, who is associated with the project for using nuclear energy for the propulsion of aircraft at the U.S. Government's plant, Oakridge, Tennessee, stated that the theory of atom-driven aircraft had been "99 per cent perfected." A way had been found by the scientists to tap power from a mobile atomic pile; now, he said, it was up to the engineers to design and build the engine and 'plane controls and protection for the crews.

In Cambridge, Mr. Brendan Bracken, M.P., addressing the University Conservative Association, foresaw the employment of atomic energy in industry, not in centuries, but within decades. If we are willing to take big risks in research, he said, the effect of atomic energy in industry could in 20 years bring renewed prosperity.

MINIATURE NEUTRON GENERATOR

FIRST-Hand knowledge of nuclear energy is now available for students by means of miniature equipment, safe and cheap enough for use in college laboratories, which has been developed in the United States.

The new apparatus, a neutron generator, employs a speck of radium, less than 1/500 oz., so that the dangers inherent in radioactivity research are virtually eliminated.

Experiments performed by students, according to Robert H. Schuler and Dr. William H. Hamill, of the University of Notre Dame, have used a small amount of a mixture of the elements radium and beryllium permitted experiments resulting in the production of radioactive isotopes.

Particularly good results are said to have been obtained in irradiating normal iodine and bromine with neutrons from the generator. Three radioactive isotopes, iodine-128, bromine-80, and bromine-82 are produced. The rapid rate of decay of these highly unstable isotopes can be observed with a Geiger counter.

Atomic Energy Discussions. — Britain, Canada, and the United States held secret talks last week at Chalk River, Ontario, on the question of atomic energy. An official stated that the discussions covered continuation of atomic co-operation between the three countries. Sir John Cockcroft, director of the British research station at Harwell, was among the delegates.

LEAD-BASE LUBRICATING GREASES

Recent Departures from Conventional Processes

A. E. WILLIAMS, F.C.S.

FOR many years a big proportion of lubricating greases have consisted largely of calcium, sodium or aluminium soaps, incorporated with a suitable mineral oil. More recently, however, there has been an increasing tendency to use other soaps with a view to obtaining modified properties in the greases. Such soaps may be based on lead, and to a lesser extent on magnesium, barium, etc.

A further development in the grease-making industry followed as a natural outcome of the enhanced cost of glyceridic oils and fats. As a consequence, the by-products of the oil refineries, "acid oils," consisting mainly of fatty acids and neutral oil in admixture, are being increasingly used in soap production for greases.

While the practice of using acid oils in grease making has the advantage of facilitating saponification, due to the high proportion of free fatty acids in such oils, some of these oils contain much colour, so that they cannot normally be used for light-coloured greases.

Lead Soaps

A grease based on a lead soap, such as lead oleate, may produce a high degree of friction reduction, combined with good stability in the lubricating film; the lead soap also imparts a fluidity to the grease which is unobtainable from the older types of grease soap.

In the production of lead soaps, the raw material may be fatty acids, a vegetable or animal oil, or acid oils from the refining of these. It is possible to produce a fairly pure lead soap, lead oleate for example, by reacting litharge (PbO) with oleic acid; but when the litharge acts on a glyceridic oil, or acid oils, a mixture of soaps results.

The solubility of such a soap mixture varies with the type of oil or fat used. In general, the chief unsaturated acids in oils and fats will produce lead soaps that are soluble in the mineral oils with which the soaps are compounded in grease making.

The more highly saturated fatty acids, on the other hand, tend to produce lead soaps that are only partially soluble.

To obtain lead soaps having good solubility in mineral oil, the grease makers choose a highly unsaturated oil, such as unhardened whale oil, or its acid oil. For lighter-coloured greases, peanut oil, or its acid oil, may be used.

Lubricating greases in general cannot be regarded as simple solutions of soap in mineral oil, but there is a relation between the solubility of a specific soap and the amount of grease obtainable having a definite proportion of soap in it. It will be obvious that the more soluble the soap is in the mineral oil, the less becomes the yield of grease obtained.

The melting point of the grease is also influenced largely by the character of the lead soaps present, and the following table shows some average melting points of lead soaps obtainable with different types of fatty acids.

MELTING POINTS OF LEAD SOAPS WITH DIFFERENT FATTY ACIDS

Fatty Acid	Lead Soap M.P. °C.
Oleic	48.2
Caproic	73.1
Caprylic	84.4
Nonylic	94.7
Myristic	106.5

Lead soaps produced from glyceridic oil, as distinct from fatty acids themselves, will, of course, contain glycerol. In many types of grease the presence of this constituent is not regarded as disadvantageous. It may even be looked upon as an asset, in that it tends to reduce the freezing point of the grease.

The presence of glycerol in certain greases designed for specific purposes is, however, undesirable and in such cases it is usual to work with fatty acid raw material, rather than undertake the recovery of the glycerol resulting from glyceridic raw material.

Grease Manufacture

In producing a batch of lead-based grease, two methods are available which differ fundamentally from each other. One of these consists of producing a mixture of lead soaps by acting on a glyceridic oil with litharge. The other involves the production of lead oleate from the sodium oleate, the lead oleate being then incorporated with a mineral oil to form a grease of the desired properties, in the same way as lead soaps from other materials are used.

A dark-coloured grease would be prepared, for example, by heating under pressure 72 per cent by weight of whale acid oil with 28 per cent of litharge. The resulting soap formed is then incorporated with from 4 to 6 times its weight of a suitable mineral oil according to the consistency desired. In

many cases a portion of the mineral oil to be used is heated with the raw materials in producing the soap.

A lighter-coloured grease, and a product with more standard characteristics, results from the use of lead oleate. In this technique, sodium oleate may first be produced by acting on oleic acid with caustic soda solution. To the sodium oleate is added a solution of lead acetate to obtain lead oleate, the latter being then dried to the required degree.

Lead oleate may also be produced directly from oleic acid by reacting the latter under pressure with litharge, and this process may take place in an atmosphere of CO_2. The object in such a process is to produce as much as possible of the normal lead oleate $Pb(C_{17}H_{33}COO)_2$, and the minimum amount of the basic lead oleate.

When litharge and oleic acid are reacted together the bulk of the product may consist of basic lead oleate. This oleate in grease making is not so desirable as the normal oleate, for the latter has the property of maintaining a suitable viscosity in the lubricant at low temperatures; a feature not possessed by the basic oleate, and the basic product also appears to have poor solubility in mineral oils.

When carbon dioxide is present during the reaction, the CO_2 combines with the basic oleate to produce $PbCO_3$ and the normal oleate. In turn, the lead carbonate is attacked by the oleic acid to give normal lead oleate, carbon dioxide and water.

In commercial processing care is taken so that the proportion of unconverted litharge in the finished batch is as low as possible, because any appreciable amount of free lead oxide in the grease would rapidly induce wear of the bearings lubricated, and so defeat the object in view.

Lead Oleate and Sulphur

The use of sulphur in combination with lead-based greases has for some years been popular for some types of machinery; the sulphur being present in the form of sulphide in the grease. Such greases are extensively used in pressure lubrication systems.

In manufacturing the grease, a mixture of basic lead oleate, mineral oil and sulphur is heated to a temperature of between 150°C. and 160°C. for a period of several hours. The main reaction occurring may be represented by the equation :—

$$2Pb(C_{17}H_{33}COO)_2.PbO + 2S = 2Pb(C_{17}H_{33}COO)_2.PbS + O_2$$

The chief feature in the manufacturing operation is careful control of temperature so as to produce the lead sulphide compound in a colloidal state. When the optimum temperature is greatly exceeded there is a tendency towards the formation of a polysulphide of lead, and this gradually precipitates in the finished product, so rendering its lubricating properties largely ineffective. Finely divided sulphur is added in sufficient proportion to combine with only one atom of lead in the basic lead oleate.

Naphthenic Acids

Naphthenic acids derived from petroleum have been successfully employed in the production of lead oleo-naphthenate to prevent "chatter" in certain types of machinery. The naphthenic acids are saponifiable and they can be made to yield sodium soaps, from which appropriate lead compounds may be prepared by treatment with lead acetate.

In industrial practice, a mixture of oleic acid and naphthenic acid is treated with caustic soda lye to produce the corresponding sodium salts of these acids. The reaction occurring may be represented by :—

$$C_{17}H_{33}COOH + C_{13}H_{25}COOH + 2NaOH = C_{17}H_{33}COONa + C_{13}H_{25}COONa + 2H_2O.$$

The oleic acid may be replaced, when desirable, by either linolic or ricinoleic acid. Lead oleo-naphthenate is then produced by the action of lead acetate on the two sodium compounds, thus :—

$$(CH_3CO_2)_2Pb + C_{17}H_{33}COONa + C_{13}H_{25}COONa = C_{17}H_{33}COO.C_{13}H_{25}COO.Pb + 2CH_3.CO_2Na.$$

The process is normally carried out in the usual type of steam-jacketed grease mixing vessel, equipped with a swing suction pipe. A mixture of oleic acid and naphthenic acids is placed in the vessel and stirred with about twice its volume of water. When thoroughly mixed, the mass is brought to a temperature of 50°C. Then the caustic soda lye, having a specific gravity of about 1.41 is run in slowly, while vigorous stirring continues.

The neutralisation point may be determined by the use of phenolphthalein, and the batch may conveniently be made slightly on the alkaline side, then acidified by adding a small amount of the two acids, so as to have a slightly acid product.

The temperature of the batch is then brought up to 80°C., and with the stirrer in motion, a 50 per cent solution of lead acetate is run in; a slight excess of the acetate over the theoretical amount being used. Agitation of the mixture is continued for a short period and when the stirrer is stopped the lead compound slowly settles out, leaving a clear upper layer of liquid. This is waste and several water-washings are applied to the batch in the vessel. The product is then dried, before being incorporated with a mineral oil.

Vegetable Oils of Africa—II

French Project for New Oil Mills

PROSPECTS of developing the vegetable oil production in Africa caused the Direction du Plan (Ministry of French Overseas Territories) in collaboration with the IRHO (Inst. de Recherches pour les Huiles de Palme et Oléagineux) to decide in 1946 to send out a mission to investigate the possibilities and decide on the most suitable sites for erecting a number of oil-mills on or near the coast. The main factors in the problem and basic principles of policy underlying the scheme are briefly outlined and discussed in *Oléagineux*.

These relate in part to native interests, their frequent preference for other products (such as cocoa, bananas, coffee), international competition, and above all availability of oil-palm products of reasonable quality to keep the mills going. These latter depend in the initial stages on indigenous forest and possibly small native plantations; but larger plantations on the European model must be seriously considered sooner or later.

Small Units

In view of the fact that the native forests and plantations average only about 50 productive palms per hectare (2.47 acres) as compared with 140 in large plantations, and the yield from each barely exceeds 2 kilos oil as compared with 20 kilos or more in the Far East, these new French mills must necessarily be of the small or medium type. Thus, there will be installed two mills of 400 tons at Dabou, Ivory Coast, and Avrankou, Dahomey; two of 2000 tons at G'Bada in Dahomey, and Dihombari, Comeroun. Four of 1000 tons are planned in various parts of French West and Equatorial Africa, with provision for extension when possible, and erection of sterilising, etc., depots at suitable points to reduce transport charges and risk of spoilage. It is hoped that, with at least some of the extensions mentioned, capacity of the eight mills will be 40,000 tons per annum within two or three years.

Equipment will vary somewhat according to type of fruit, and of the processes used, the wet, continuous press, and solvent methods will probably be for the most part eliminated, in favour of centrifuging and hydraulic pressing. Orders for the required plant have been given to the Stork firm of Amsterdam, who specialise in oil-palm machinery. A layout of the proposed plant at Dihombari for palm oil production, is described and illustrated, including two hydraulic presses and two De Laval centrifuges. The palm kernels are collected, dried, and stored, and are presumably exported or dealt with elsewhere.

It is proposed that the mills and their equipment should belong to the Colonial governors of the respective territories, representing the French government, and be administered by a management company under agreement with the governors. Principal terms of these agreements provide for local representation, allocation of 25-30 per cent of profits to improve plantations (fertilisers, etc.) and for native social services or welfare, payments to the natives (said to be very remunerative) based on oil content of fruit and its current value, and provision to avoid undesirable competition with other mills, private and independent. At the same time these new mills will not have an unlimited or uncontrolled monopoly.

Practical progress has been already made with four of the mills: at Dihombari, 18 km. from Doula by water; Avrankou, 35 km. from Port o-Novo; G'Bada; and Dabou in the Ivory Coast. Delays due to various causes, both in Africa and Europe, including labour and political difficulties in both Holland and France, have tended to postpone dates of completion.

It is hoped that the first mill to be ready, Dihombari, will commence operations in the summer of next year, and the last of the eight by 1950. The following improvements are anticipated: better quality oil by lowering the acid number from about 25 to 4 per cent; increase of fruit yields per kilo from 45 to 90 per cent; thus assuring to the native producer a more remunerative working day, say, from 3.5 kilos to 8 kilos.

Great Resources

That there is scope for these improvements and development generally may be deduced from the fact that the total area of oil palm forest in French Africa has been estimated at 3 million hectares (ha. = 2.47 acres), containing roughly 300 million oil-palms, of which two-thirds are productive. Eventually, under better management, the proportion of sterile palms—at present about 30-35 per cent—should be substantially reduced.

(The estimate of 100 palms per ha. or about 66 productive, is substantially higher than previously stated for native plantations, *i.e.*, 50 productive palms.)

[The previous summary in this series appeared on September 25, page 432.]

SCARCITY OF CHEMICAL PLANT

Manufacturers Facing Unprecedented Demand

OF all the problems contributing to current supply difficulties throughout chemical industry, inadequacy of present plant and buildings and the impossibility of procuring quickly replacements of either constitute the chief barriers to greatly increased production. This was one of the circumstances to which prominence was given last week by speakers at the annual dinner of the Association of British Chemical Manufacturers (pp. 550-53 this issue).

In view of the implied criticism of chemical plant manufacturers, THE CHEMICAL AGE submitted to a representative authority in the industry the question why plant manufacture had apparently lagged behind other supplies. The answers, in the form of an interview reproduced here, help to clarify the problems with which chemical plant manufacturers are faced.

What Mr. Harold Wilson (President of the Board of Trade) said at the dinner of the ABCM, about the chemical engineering plant industry not being geared to reach the greatly increased level of production required of it since the war, is perfectly true. The demand and the rate of growth of that demand have been sudden; it is doubtful if any supply industry would have been capable of keeping pace with it.

Notwithstanding all the difficulties, there can be no doubt that the chemical plant manufacturing industry has expanded since the war; a number of firms have, in fact, expanded very considerably. But to assess what this development represents one has to remember that there exist obvious difficulties—the uncertainty whether building will be permitted, the shortage of machine tools, and, more embarrassing than all these problems, the shortage of steel and other essential components. Meanwhile, the demand for new chemical equipment since the war has been unprecedented.

Unparalleled Demand

This, of course, is a world problem. The demand for chemical plant has never remotely approached the current level. Other countries, increasingly anxious to become self-sufficient, are trying to build up in their own lands some of the basic industries, like chemicals. Nearly all need plant.

In attempting any review of shortage of chemical plant full weight must be given to the great contributory cause—the complete stoppage of supplies from Germany, from which country, before the war, came a large proportion of the world's supplies. Thus in those countries needing chemicals, or which are attempting to manufacture chemicals for home consumption or for export, there continues this terrific demand for plant, and one of the traditional suppliers is no longer active.

Predominantly the chemical plant industry here needs more steel. So also do a lot of other industries, the making of electric motors—to mention only one—which are closely linked with chemical plant manufacture. All things considered, therefore, it may fairly be said that the chemical plant manufacturing industry is doing, and has been doing for a long while, a very good job of work.

Export Policy

The home chemical industry is not, as might be supposed, being sacrificed to permit the chemical plant manufacturers to export. Plant manufacturers are, of course, important exporters, but the industry is very conscious of the part it has to play in helping the home chemical industry, and is prudent in accumulating for itself a high dollar and other exchange potential.

There is abundant evidence that there exists very close co-operation between the two industries of chemical plant manufacture and chemical manufacturing, to the useful end of exchange earning which we have mentioned. The other side of the problem which has to be considered is the effect of sending plant to another country so that it can set up a chemical industry capable of competing with Britain and, in theory, reducing our own exports That is evidently not desirable, but is it not a fact that, if a country has made up its mind to go in for chemical or any other manufacture, it will do so in any event? And if they cannot buy their plant here, they will assuredly go elsewhere for it. So, with the advantage conferred by the disappearance of the greatest pre-war competitor in this field—Germany—there is a clear duty for the chemical plant industry of this country to establish itself firmly in the new markets.

The measure of co-operation existing between British plant and chemical industries in regulating supplies is worth stressing. This has operated even to the extent of ensuring that the home manufacturers of specifically chemical plant are not saddled with an export target. It has to be acknowledged that the chemical plant manufacturers have had much assistance from the Government as far as lay in officials' power,

(*Continued overleaf*)

Scientific Films

Widening International Organisation

THE scientific Film Association, reviewing some of the results of the recently concluded International Scientific Film Congress, states that a wide-ranging programme for the coming year was prepared and among the special subjects for which sub-committees were set up were:—

1. The establishment of an international data card for compiling a master index of scientific films available throughout the world and the formulation of methods of appraisal of these films.
2. The joint production, by a number of countries, of films of common interest.
3. The exchange and distribution on the widest scale of scientific films and the customs regulations affecting such exchange.
4. The setting up of a Scientific Film Reference Library.
5. The exchange of information between nations by means of a regular journal.

The officers elected for the coming year are: President, M. Jean Korngold (Poland); vice-presidents: Mr. John Maddison (Great Britain), Mr. C. A. Burmester (Australia); hon. secretary: M. Jean Painleve (France); hon. treasurer: M. Luc Haesaerts (Belgium).

The congress, says the association, has shown once again that the film is one of the most important means of disseminating knowledge. On this occasion, however, it must also be stressed that the film will have a major role to play in the joining of nations for the common purpose of progress, often transcending barriers of language, by the use of moving pictures.

SCARCITY OF CHEMICAL PLANT

(Continued from page 561)

the steel industry, which really seems to have the bit between its teeth has in the last two years done much to make recovery possible.

The export target that does exist is a joint one coupling "gas and chemical machinery"; this is how the figures for these two industries are presented in the official Board of Trade returns. And this joint target has more than been achieved. The monthly rate of exports in 1938 for these two industries jointly ("gas and chemical machinery") was £27,000. Now the monthly rate is £142,000, which is a little higher than the actual target to be achieved by the end of 1948. In considering these totals, however, it must be borne in mind that industrial plant figures do tend to fluctuate; at any given date allowance may have to be made for some big contract, which will completely transform the average export figures.

Pyrethrum in New Zealand

Investigation to Increase Yields

TWO further reports on growing pyrethrum are given in the New Zealand Journal of Science and Technology, Volume 29, No. 4 (December, 1947).

No. II report, by E. C. Chamberlain, assistant director, plant diseases division, and P. J. Clark, chemist, Dominion Laboratory, Department of Scientific and Industrial Research, deals with the selection of clones and pyrethrin content of flowers.

No. III, by P. J. Clark, Dominion Laboratory, E. E. Chamberlain, assistant director, and C. H. Proctor, technical assistant, Plant Diseases Division, Department of Scientific and Industrial Research, covers the factors influencing pyrethrin content of flowers.

The pyrethrin content of flowers of any one clone was found to vary from season to season, but in spite of fluctuations it remained consistently higher in some clones. Results showed that these variations make it possible to select strains which are of greater economic value than seedling plants.

The content of pyrethrin was shown by analyses to be progressive with the development from the bud to the fully-opened flower.

The effect of temperature during artificial drying of the flowers revealed there was a slight loss of pyrethrins when heated at 132°F. for nine hours, but low temperatures had no adverse effect.

When drying flowers it was found that humid weather was apt to infect them with a species of mould fungus which caused loss of pyrethrin content of 25 to 49 per cent.

The effect of locality on the pyrethrin content failed to establish the superiority of any one district, and the proportion of pyrethrin I to pyrethrin II was found to vary with different clones.

Austrian Mining Progress

A report published recently by the Austrian mining department shows that iron ore output aggregated during the first six months of the current year over 603,500 tons, as compared with about 336,000 tons in the same period of 1947. Coal production rose during the same period from roundly 1,455,800 to 1,709,100 tons. Copper ore output was more than doubled at nearly 18,000 tons and output of antimony ore rose from 560 tons in the first half of 1947 to 3060 in the same period of this year. There was a five-fold rise in graphite output from just over 1000 tons to about 5500 tons, and kaolin production was doubled to about 65,300 tons (29,100). A noteworthy increase also took place in the mining of magnesite.

CANADIAN COMMENTARY

Widening Interest in Titanium

THE development of vast titanium ore deposits in Canada (THE CHEMICAL AGE, Sept. 25) and increased production from deposits in the United States over the next few years are expected to free American industry from dependence on overseas sources for its raw material supply, stated the president of the National Lead Co., recently, whose firm is said to be one of the principal producers of titanium pigments. He said that the Kennecott Copper Corporation's recent announcement of plans to mine and smelt ilmenite-iron ores on a large scale in Canada was good news to the producers of titanium pigments.

* * *

Dominion Magnesium, Ltd., is stated to be producing a few lb. of titanium daily by pilot plant methods, but officials say the operation is such that commercial production in quantity could be established within a matter of weeks as markets develop. Samples have been supplied to industrial users, including General Electric, International Nickel, and the Bell Telephone Co. Dominion Magnesium produces titanium by a new process developed by Dr. L. M. Pidgeon, consulting metallurgist and professor of metallurgy at the University of Toronto, assisted by D. W. Rostrom. The method is said to give direct reduction of commercial pigment grade titanium oxide into titanium metal, the U.S. methods for producing the metal requiring an intermediate step. Products which Dominion Magnesium is now organised to produce include barium, strontium, calcium, magnesium and titanium. No magnesium has actually been produced since the war, as the company has been busily engaged reducing its large stocks inherited from war-time operations, but it is deemed necessary to resume production of the metal next year.

* * *

An interesting study of the effect of abundant hydro-electric power on the growth and development of the aluminium industry in Canada is given in *Commonwealth Survey*, No. 8, dated October 2.

The great rivers of the country are mainly responsible for the existence of the industry, supplying not only abundant hydro-electric power but also providing water highways for the incoming raw materials and outgoing finished product.

Raw materials for the industry, apart from sulphur from the United States, come from various parts of the Commonwealth. Bauxite is obtained from British Guiana, and fluorspar, used in smelting, comes from Newfoundland.

The rise in production was mainly brought about during World War II by the need for aircraft expansion. In 1938 production was 65,000 metric tons, which had increased to about 450,000 metric tons in 1943, the year of highest output. A natural decline followed with the end of the war, but figures for 1947 were 270,000 metric tons, or more than four times those of 1938.

Among exports, aluminium ranks about eighth in the country's list, the Commonwealth countries taking more than half.

* * *

The use in Canada in the trade year 1946-47 of a total of 657,282 tons of fertilisers of all types has been recorded by the Dominion Bureau of Statistics. Of this total, 561,464 tons were mixtures. Of the total tonnage of mixed fertilisers used, 60 per cent was of two grades: 176,647 tons of 2-12-6 grade and 164,986 tons of 4-8-10 grade. The 2-12-6 is by far the most popular for grain and farm crops and the 4-8-10 is the potato and garden crop grade. Other countries may be using more nitrogen for these crops, but so far Canada has not found this to be necessary. There is now relatively little organic nitrogen used for fertiliser purposes. Small amounts are supplied in some tobacco fertilisers, and a relatively small tonnage of bone meal, tankage and blood is sold. Canadian exports of nitrogen under International Emergency Food Council allocations during the year ended June 30, 1948, are estimated at 132,422 tons, as compared with the total domestic consumption of 27,000 tons.

* * *

Deliveries of heavy fuel oils to Canadian users totalled 1368 mil. gal. in 1947, as compared with 1074 mil. gal. in 1946, according to a compilation made by the Dominion Bureau of Statistics from reports submitted by refineries and their distributors and by major consumers. About 26 per cent of the 1947 total was for fuel in manufacturing plants and 2.9 per cent for material in manufacturing plants. In addition 25.6 mil. gal. of fuel oil and 1.2 mil. gal. of kerosene were shipped for export by Canadian refineries.

Technical Publications

A WIDE variety of uses is claimed for bacteriological peptone, a dried proteolysed muscle preparation, in a pamphlet issued by Evans Medical Supplies, Ltd., Speke, Liverpool. Bacteriological peptone (Evans) is a light coloured granular powder, free from fermentable carbons, and conforms with the requirements of the indole test. It has proved satisfactory as a constituent of liquid culture media for penicillin assays, streptomycin production, identification and differentiation of bacteriological strains, preparation of tuberculins, vaccines, dried cultures, and other purposes.

* * *

Some of the most impressive evidence of the extension of remote control and recording applied to the largest scale industrial units are presented in the current illustrated booklet issued by Evershed & Vignoles, Ltd., of Acton Lane Works, Chiswick, London, W.4. This is very largely a pictorial survey of some of the remarkable achievements in remote indication and centralised control and of the instruments by which they have been rendered possible. Docks at Sydney, and pumping and electricity undertakings here have contributed pictorial evidence of long-range control, without which the co-ordinated operation of some of the largest works would be almost impossible. The line drawings which are included provide a good deal of useful technology.

* * *

How many manufacturers and producers make the best use of the art of advertising? In a well-produced and attractive book entitled "The Work of an Advertising Agency," Mr. Robert S. Caplin (R. S. Caplin, Ltd.) deals efficiently with this problem (to quote his own words) "in such a way as to make a hard job easy to understand." He points out that the work of an advertising agency is most successful when least obvious. The book is divided into three groups covering all aspects of an agency's work—research and planning, creative production, mechanical production (blocks, type, vouchers, accounts, etc.) and public relations.

* * *

The power of photographs or illustrations to attract attention is well-known; watch any reader pick up a book or magazine, and he (or she) will invariably look at the illustrations first. Widnes Foundry & Engineering Co., Ltd., not only realise this, but also recognise that "a picture explains more than a thousand words" is especially true of engineering products. Their latest publication "Fabrication of Steel" shows in a series of excellent photographs the company's ability to produce special purpose castings for the chemical, oil and allied industries. Among a variety of adsorbers, storage tanks, plate bending rolls, etc., the human side is illustrated by the picture of a woman war-time trainee, now one of the most skilled operators, at work electric arc welding in the constructional department.

* * *

"Products of the Chemical Division, Koppers Co., Inc." is the title of a bulletin just issued, listing all products offered for sale by this division of the Koppers Company. The bulletin, listing a number of new products introduced this year, presents the structural formula of each, together with brief information on properties, uses, and reactions. New products listed include six chemicals and two more thermoplastic moulding powders of the cellulose acetate and ethyl cellulose type.

* * *

The publication of three new British Standards relating to coal tar by-products is announced by the British Standards Institution. They are: B.S. 1469/1948, Coal Tar Liquid Fuels; B.S. 517/1948, Cresylic Acid of Specified Orthocresol Content; and B.S. 521/1948, Cresylic Acid of Specified Metacresol Content.

* * *

A paper on the future development of the Japanese economy and the opportunities for British trade with Japan has been written by H.A. Macrae, C.M.G., M.B.E., formerly Minister (Commercial) at H.M. Embassy, Tokyo, who visited Japan in 1947, at the invitation of the Government. The paper was published this week for the Board of Trade (HMSO, 9d.).

* * *

Fansteel Metallurgical Corporation, North Chicago, Ill., is offering in a new bulletin five copper-base alloys for electrical and mechanical applications, other than resistance welding. They are said to possess desirable properties of greater strength, resistance to deformation and wear and higher elasticity than copper, brass or the common bronzes, retaining at the same time high thermal and electrical conductivity.

A CHEMIST'S BOOKSHELF

Organic Analytical Reagents. F. J. Welcher. (New York: D. Van Nostrand Company, Inc.). London: Macmillan and Co., Ltd. Vol. III, 1947, Pp. xi + 593. 44s. Vol. IV, 1948, Pp. xiii + 624. 44s.

The pleasure to a reviewer inspired by the appearance of this set of volumes is no less than was engendered by the first two volumes (THE CHEMICAL AGE, 1948, 58, 497.) The advantage of possessing the additional two volumes might be represented in terms not of arithmetical, but of geometrical progression.

It is to be assumed, though this is not explicit in the four volumes, that the work as originally planned is now complete, that is, in so far as such a work can ever be complete. The reviewer would, of course, rather regard this as the beginning of the author's work. Thus, to take only one example, the published work on cyclohexanedionedioxime has been considerably extended since the author's self-imposed deadline of January 1, 1946. But it is to be hoped that supplementary volumes will, from time to time, keep the subject up to date. Such offerings will earn the heartfelt gratitude of analytical chemists throughout the world. This prospect may well be one reason for the omission of a general index to all four volumes, inclusion of which would, however, save a certain amount of mechanical labour and might therefore be included in the first supplementary volume. It is significant that the volumes have become progressively larger from I (although, by the use of thinner paper, Vol. IV is actually smaller than Vol. III), and the contents, of which a summary follows, are correspondingly enlarged in their range.

Vol. III contains sections on pyridine and its derivatives, quinoline and quinoline derivatives, dipyridyl and related compounds, pyrazolone derivatives, miscellaneous heterocyclic nitrogen compounds, dioximes, acyloin oximes, hydroxyoximes, monoximes of diketones, isonitroso compounds, nitroso phenols, miscellaneous oximes, cupferron and neocupferron, nitrosoamines, rhodanine and its derivatives, carbazides, thiocarbazides and semicarbazides, carbazones, thiocarbazones and miscellaneous imino compounds. About 150 compounds are dealt with.

Vol. IV, which lists about 360 compounds, is divided into chapters on acidic nitro compounds, the arsonic acids, the dithiocarbamates, the xanthates, miscellaneous sulphur compounds, sulphonic acids, sulphinic acids, seleninic acids, alkaloids, diazonium compounds, carbohydrates, miscellaneous natural substances, miscellaneous compounds, lake-forming dyestuffs, hydroxyanthraquinone dyes, miscellaneous dyes, and dyes used in the detection of nitrite.

As a tailpiece, to render in terms of figures the enormous task which Dr. Welcher has so successfully accomplished, in nearly 2200 pages about 860 reagents are dealt with, these having been classified into 58 categories. In the four volumes, if the arithmetic of the reviewer can be trusted, no less than 9182 references to the literature have been given. Dr. Welcher might well have been forgiven if he had somewhere added yet a further reference—to the opening words of Q. Horatius Flaccus, *Carminum, 3*, 30 (AUC 730?)!

Dix ans d'application de la radioactivité artificielle. By Dr. Pierre Süe (Société d'Editions Scientifique, Paris, 1948). Pp. 258. 675 francs.

The importance of radioactivity as a rapidly developing branch of science makes it difficult to keep up with the quantity of material produced on this subject. In his survey on the use of radio tracers Dr. P. Süe, research director in Prof. Joliot's Laboratoire de Chimie Nucléaire, gives a compilation of the writings up to 1947. In the main section material is arranged according to the subject of researches, and there is an excellent bibliography, which so far seems to have no equal in the English language.

Metals and Colours

The close affinity which exists between metals and colours is emphasised in the September number of the *Alloys Metal Review* issued by High Speed Steel Alloys, Ltd., Widnes, Lancashire. In an excellent article "Molybdenum and Tungsten in Fancy Dress," G. E. Hillier discloses how the introduction of these metals into the preparation of pigments has made many new colours available in paint, printing, rubber goods and plastics.

Europe's Hydrogen Peroxide

Data from Germany and Austria

PRODUCTION and use of hydrogen peroxide in Europe has been the subject of a number of reports recently; the latest, which has just been distributed in the U.S.A., deals with manufacturing processes in Germany and Austria.

Production in Germany before and during the war was recently the subject of an authoritative paper by V. W. Slater and W. S. Wood (THE CHEMICAL AGE, September 11).

German plants (with one exception), according to the report, used the potassium persulphate process, instead of the more recent ammonium persulphate (all liquid) method more usual in other countries. Germany had, however, developed production equipment for 82-85 per cent concentrated hydrogen peroxide, while only the pilot-plant stage had been reached in Austria.

Details are given of the persulphuric acid process, as well as flow charts, equipment diagrams, and a bibliography relating to all the processes described in the text.

Copies of the report, No. PB-88844 "Hydrogen Peroxide Manufacture in Germany and Austria" (pp. 72, $2.00 per copy), may be obtained from the Office of Technical Services, U.S. Department of Commerce, Washington 25,D.C.

Other reports issued by the Department of Commerce dealing with the same subject are: "Hydrogen Peroxide: Electro Chemische Werke," (PB-215, 17 pp., 25 cents): "Manufacture of Hydrogen Peroxide," (four reports; PB-78243, $1.00; PB-33492, $4.00; PB-33490: $1.00; and PB-1737, $1.00): "Hydrogen Peroxide for Mil Sterilisation," (P.B-31003, $5.00, and PB-2461, $35.00): and "Handling of High Concentration Hydrogen Peroxide," (P.B-42503, $2.00).

German Technology

More News of Industrial Techniques

FURTHER reports on German industry are published to-day and may be seen at the principal public libraries, Chambers of Commerce and professional and scientific institutions. Copies may also be purchased from H.M. Stationery Office (Sales Office or ordered by post (PO Box 569, London S.E.1).

These are:—

BIOS 1776: Yeast and citric acid production from sugar-beet molasses (2s.).

BIOS 1781: Production of monomeric styrene at Chemische Werke, Huls (42s.).

BIOS 1783: German practice in the production and utilisation of high boiling coal tar chemicals (4s. 6d.).

BIOS 1789. Manufacture of salt-cake and hydrochloric acid in the Mannheim area and in Gravenbrueck (2s.).

BIOS 1790: Aluminium chloride and alkali-chlorine plants (9s.).

BIOS 1797: Centrifugal casting in Germany with particular reference to the production of non-ferrous tubes (6s.).

BIOS 1808. *Synthetic insecticides* (4s. 6d.).

BIOS/MISC. 103. Dutch report on visit to the German battery industry (1s.).

Other reports recently made available are:

FIAT 1298: The manufacture of 1, 4, 5, 8 naphthalene tetracarboxylic acid (1s.).

FIAT 1305: The Schmalfeldt process for making synthesis gas from methane (3s.).

FIAT 1314: The preparation of 2-methyl-5-ethylpyridine from methyl vinyl ether (1s.).

In addition to reports, a large library of original German documents is maintained by Technical Information and Documents Unit, German Division, Board of Trade, 4 Cadogan Square, London, S.W.1.

ITALIAN CHEMICAL TRADING

THE chemical section of the Industrial Sub-Commission of Northern Italy has prepared the following plan for imports and exports of chemical products during the period July 1948 to July 1949. The totals are expressed in values (of million lire):

IMPORTS.—Essential oils, 386.6; gums and waxes, 1905; mineral salts and oxides, 1612; tar distillation products, 5463; plastic materials, 166; solvents and plasticisers, 195; tanning products, 39.5; pharmaceutical products, 1714.3; miscellaneous, 6699.2.

EXPORTS.—Carbide of calcium, 120; essences, essential oil, and synthetic perfumes, 2519; abrasives, 18.5; mineral salts and oxides, 1356.4; pharmaceutical products, 1500; photographic products, 1100; miscellaneous, 3800; dyestuffs, etc., 2700; plastic materials, 900; tanning products, 4800; boracic products, 123; caustic soda, 6000; carbonate of soda, 600; pyrites, 1440; sulphur, 1460; nitrates, 1790; Superphosphates, 120; alumina, 900.

TRADE WITH THE BIZONE

THE recent commercial agreement between Italy and Bizone, Germany, which will be valid until June 30, 1949, comprises, among other things, the following Italian exports to Germany. The totals are expressed in values of thousand dollars:

Nitrate fertilisers, 1000; raw cork and cork parings 650; olive oil (sulphided), 250; sulphur, 300; talcum 280; bauxite, 500; various chemical products, 750; tanning extracts, 1300.

Among the products that Germany will export to Italy under the agreement are the following:

Refractory materials, 260; various earths, 255; benzol, toluol and xylol, 470; dyestuffs and pigments 1500; pharmaceutical and intermediate products 1250; various chemical products, 500; photo-gelatine 150.

Home News Items

Town Gas Record.—A record sale of gas and a profit of £13,000 was reported by Warrington gas undertaking last year.

Change of Address.—The Information section of the Department of Scientific and Industrial Research has moved to: Rex House, Regent Street, London, S.W.1; telephone: Whitehall 9788. The chief information officer is Mr. Walter Hingston (Ext. 7). Headquarters of the department remains, at present, at 24 Rutland Gate, S.W.7.

U.S. Plan for British Refinery.—The project of Standard Oil of New Jersey to construct a large-scale oil refinery in Britain under Marshall plan auspices has been tentatively approved by the British Government. The refinery, estimated to cost £25 million, would be situated at Fawley, near Southampton, and on completion would be capable of refining 12,000 barrels of crude oil daily.

Rayon Plant for Poland.—After long negotiations between the Polish Purchasing Mission in London and Dobson & Barlow, Ltd., Bolton, Lancs., a contract has been signed of a value of £250,000 for the supply of "Nelson" continuous spinning plant—including a large part of preparation machinery—to produce 2½ tons a day of continuous filament rayon yarn. This will be the first installation of British rayon spinning machinery in Poland.

New Research Laboratories.—The reconstruction of laboratories with modern equipment at Rowett Research Institute, Bucksburn, has just been completed and the opening ceremony is to be performed to-day (Saturday) by Mr. Arthur Woodburn, Secretary for Scotland. The reconstruction will enable scientists to employ new techniques in their work in the field of nutrition. The old Reid Library building will be utilised as a physiology department.

Coal Output Up.—The total British coal output last week was higher by 61,800 tons compared with the previous week. There were increases in both deep-mined and open-cast coal. Last week's figure of 4,228,000 tons (3,981,200 tons deep-mined, 246,800 tons open-cast) compares with 4,166,200 tons (3,930,100 tons deep-mined, 236,100 tons open-cast) in the previous week. The cumulative output of deep-mined coal for the 41 weeks of the year was, however, at 153,289,900 tons, still 1,941,600 tons below what it should have been to ensure the year's target of 200 million tons being reached.

Groundnut Scheme.—Considerable progress has been made in the Kongwa area since the visit of Mr. John Strachey, the Food Minister, in June. Bushland to the extent of 52,000 acres has been flattened out, nearly 40,000 acres contoured and almost 20,000 acres ploughed ready for planting.

Board of Trade's New Address.—The Board of Trade announces that from October 25 the address of the Directorate of Mica and Cork Section will be: 7th Floor, Horseferry House, Thorney Street, S.W.1. The telegraphic address of the Export Licensing Branch of the Board of Trade, Regis House, 43/46 King William Street, E.C.4, has been changed to Explic, Stock, London.

Gasholder Revolves.—The rotation at the rate of 1 in. a month of the Birmingham gas department's high-pressure storage holder at Longbridge is astonishing experts. The revolution is thought to be due to the action of the sun. Timely action by engineers prevented damage of inlet and outlet pipes which might have been caused by the movement and could have led to an explosion. The holder is cigar-shaped, 200 ft. in length, 25 ft. in diameter and weighs 460 tons.

TWO VIEWS ON STEEL

IT would be a national calamity if, in the near future, an upheaval took place in the British steel industry, said Lieutenant-Colonel J. P. Hunt, Master Cutler, Sheffield, at a general meeting of the Trades House of Glasgow last week. "Let those men who know the job get on with it," he added, "and do not muddle them." One of the things Glasgow and Sheffield had in common, he said, was their dependence to a large extent on steel for their prosperity. A considerable amount of the steel used in Sheffield was manufactured near Glasgow, and its quality was unbeatable.

* * *

The Minister of Health, Mr. A. Bevan, speaking at Gateshead last week, said the Labour movement was pledged to the nationalisation of steel and was going on with it. "I shall say no more about it now because I do not want to anticipate the deluge that is going to fall upon the steel masters when the argument starts. They have had it all their own way up to now. Restraint is very difficult, but when the debate starts the intellectual bankruptcy of the steel masters will be revealed."

Personal

The late MR. HARRY BREARLEY, discoverer of stainless steel, in his £80,000 will has left a large trust fund for a foundation to give promising youths a chance to study, travel, and advance themselves. Born in Sheffield, son of a crucible steel maker, the benefactor himself left school at eleven. He bought books and attended a night school until he qualified as a metallurgist and chemist.

MR. S. A. GREGORY, of the A.P.V. Co., Ltd., has just returned from a tour of four months in the Middle East, during which he has been studying the processing of agricultural products. Countries visited were Greece, Cyprus, Egypt, Iraq, Syria, the Lebanon, Palestine, and Turkey.

SIR LAURENCE BRAGG, professor of physics at Cambridge University, left Liverpool in the *Media* on October 16. He is to give 17 lectures during a tour of American universities.

MR. HERBERT REGINALD BEAUCHAMP has been appointed a director of Scottish non-Ferrous Tube Industries, Ltd.

CHEMICAL ENGINEERING LECTURES

A NUMBER of interesting lectures are scheduled to be given this term in the department of chemistry at the Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C.3.

Commencing on October 29, a series of eight lectures will be given on Friday evenings at 6 p.m. on "Materials of Construction in Chemical Engineering." The first lecture will be stoneware and other ceramics by G. S. Shipley, followed by: stainless and other special steels—G. E. Speight; lead and its alloys—B. N. Reavell; copper and its alloys—S. Baker; aluminium and its alloys—W. K. B. Marshall; ferrosilicon alloys—R. V. Riley; plastics—J. Taylor; vitreous silica—G. E. Stephenson. The fee for the course is 15s. A further series of lectures "Unit Operations in Chemical Engineering" will be given in the second term, beginning in January, 1949.

Applied statistics form the subject of a course of lectures suitable for graduates interested in the practical application of statistics to problems of manufacture and research. B. P. Dudding will give the first of eight lectures on "Statistical Methods in Industry" at 7 p.m. on Monday, October 25.

"Design of Experiments" will be the topic of eight lectures to be given by K. A. Brownlee in the new year, beginning on Monday, January 24.

The fee for either or both courses is £1.

Obituary

MR. ARCHIE SANDERCOCK, whose death is announced, was deputy chairman and deputy managing director of Glaxo Laboratories, Ltd., Greenford, Middlesex. Born at Teignmouth, S. Devon, in 1885, Mr. Sandercock was educated at Sidcup College and began his business career on the Stock Exchange. In the 1914-18 war, he rose from gunner to the rank of major. When hostilities ceased Mr. Sandercock joined the

Mr. A. Sandercock

board of Joseph Nathan & Co., the forerunners of the present Glaxo organisation. Two years ago he was appointed deputy chairman and deputy managing director of the company. He travelled extensively in the firm's interest and had visited South America, Australia, New Zealand, Denmark, and Poland. Mr. Sandercock, whose home is at Budleigh Salterton, Devon, is survived by his wife and two children.

DR. HOWARD W. MATHESON, whose death is reported, at his home at Hudson Heights, Quebec, was formerly vice-president of Shawinigan Chemicals, Ltd., and a director of associated companies. He was a prominent figure in the chemical research field and was identified with many scientific and technical societies.

Research and Recovery.—The importance of research and the application of knowledge resulting from it was the theme of the speeches at the 29th annual meeting of the British Cotton Industry Research Association at the Shirley Institute, Didsbury. Sir Harold Parkinson, presiding, said that the textile industry as a whole was not making the most of the fund of knowledge at the institute.

Overseas News Items

Czech Glass Output.—The average monthly output of Czechoslovakia's glass works rose from 20,076 tons in the first half of 1947 to 22,194 in the first half of the current year.

Oil Search in Finland.—The Gulf Oil Corporation is reported to be searching for oil in the neighbourhood of Abo, Finland, in accordance with a recent concession agreement, states the Petroleum Press Bureau.

New Swiss Glass Works.—The Glaswerk St. Rupert A.G., which has recently been established in Niderhelfenschwiel, Switzerland, is chiefly to produce lead crystal glass, which has so far not been manufactured in the country. Work is expected to commence towards the end of this year.

More Uranium Located.—For the second time in a few weeks uranium has been discovered in Southern California—by a plumbing contractor, while digging a swimming pool at his ranch at Costa Vesa. It is not yet certain whether it is in recoverable quantities.

New U.S. Ceramics Laboratory.—Work is in progress by United Clay Mines Corporation, Trenton, N.J., on the construction of a new research and technical laboratory for clay investigations. The work to be carried out will comprise intensive studies to develop clays for specific applications in various industries.

Oil Construction in Argentina.—The Argentine State Oil Fields invite tenders for the building of a lubricating oil refinery with an output of 100,000 cu. m. a day. The consumption of lubricating oils in Argentina has risen with the expansion of industry, improved transport and public services. Tenders are also invited for the supply and installation of a plant for crushing bauxite in the San Isidro factories.

New Spanish Oil Refinery.—It is believed that a new oil refinery will be erected at Cartagena, Spain, by the Caltex organisation (in which Standard Oil of California and the Texas Oil Co. have joint interests) and two Spanish companies. The National Industrial Institute, a body set up by the Spanish Ministry of Commerce and Industry, is to hold about 52 per cent of the shares, while 24 per cent will be in the hands of the Spanish oil company, C.E.P.S.A., the U.S. interests, which are to provide the equipment needed, holding the remaining 24 per cent. Initial daily capacity will be between 15,000 and 20,000 barrels, the crude oil to be shipped chiefly from the Middle East.

Nitrogen Fixation Plant for Bulgaria.—A nitrogen fixation plant is reported to be under construction at Dimitrovgrad, Bulgaria. Annual output of chemical fertiliser is to total some 65,000 tons.

Buna Production Ended in W. Germany.—The manufacture of synthetic rubber of the Buna type has been ended in W. Germany, the Hüls plant having been converted to the use of natural rubber only.

Turkey to Increase Lignite Exports.—Turkey is planning to expand its export of lignite, considerable stocks of which have been accumulated recently for which no domestic use can at present be found.

New U.S. Porcelain Adherence Meter.—An improved portable instrument for determining the adherence of porcelain enamel to base metals has been announced by the Porcelain Enamel Institute, Washington, D.C., and adopted by the Institute as the standard "PEI Adherence Meter," states (U.S.) Ceramic Forum.

Reviving Tin Output.—Sufficient reconstruction has been carried out on the tin properties in the Netherlands East Indies that pre-war production capacities will probably be reached next year, according to the Netherlands Economic Bulletin. The Netherlands-Indies Tin Board has been set up in Batavia "to safeguard and co-ordinate the national interest in the exploitation, production and sale" of the metal.

Madagascar Graphite Mining.—American mining equipment and machinery, according to Paris reports, are to be sent to Madagascar to help increase output of graphite for the U.S. strategic stockpile. Graphite production, which had recovered to 15,000 tons per annum by the end of the war, had declined again during the political unrest of 1947, when installations were partly destroyed. It is hoped that by the end of next year some 7000 to 8000 tons of graphite will be available.

Stimulus for Vanadium.—The U.S. Atomic Energy Commission disclosed on October 16 that it was negotiating with the Vanadium Corporation of America to buy uranium from two ore treatment plants which were to be brought into operation by the Corporation next year. As a result, the commission foresaw a stimulus to the prospecting and mining of the vitally important ore in the western states of America. At present, much of the uranium used in the American atomic energy programme was from Canada and the Belgian Congo.

Next Week's Events

MONDAY, OCTOBER 25

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3, 7 p.m. First of a course of eight lectures on applied statistics. B. P. Dudding: "Statistical Methods in Industry."

Manchester Federation of Scientific Societies. Institution of the Rubber Industry, Engineers' Club, Manchester, 6.15 p.m. E. R. Thornley and G. A. Pittman: "A Dynamic Compression Test for Rubber/Cord Fabric Adhesion."

Institution of Works Managers (Glasgow). Institution of Engineers and Shipbuilders in Scotland, 7 p.m. C. A. Oakley: "Some Aspects of Industrial Psychology as Applied to Works Management."

TUESDAY, OCTOBER 26

Royal Institute of Chemistry (London and South-Eastern Counties Section.) The Cherry Tree, Welwyn Garden City, 8 p.m. T. S. Jones: "Polypeptide Antibiotics—Biological Polymers."

Institution of Chemical Engineers. Burlington House, London, W.1, 5.30 p.m. M. W. Thring: "Construction of models in which more than one process is similar to the original."

Sir Halley Stewart Trust. Memorial Hall, Farringdon Street, E.C., 6 p.m. First of a series of six lectures. Prof. M. L. Oliphant: "The Atomic Age. I—The Scientific Achievement."

Hull Chemical and Engineering Society. Church Institute, Albion Street, Hull, 7.30 p.m. H. R. Galleymore: "Synthetic Detergents."

WEDNESDAY, OCTOBER 27

Society of Chemical Industry. Food Group, London. Prof. A. St. Huggett: "Nutrition and Pre-natal Development."

Institution of Welding. Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. J. H. Paterson: Presidential address.

Manchester Literary and Philosophical Society (Chemical Section). Portico Library, Mosley Street, Manchester, 5.30 p.m. Dr. E. J. F. James: "Chemistry and Education."

THURSDAY, OCTOBER 28

The Chemical Society. Burlington House, London, W.1, 7 p.m. Sir Robert Robinson: "Strychnine, Brucine and Vomicine."

Royal Institute of Chemistry (Manchester). Reynolds Hall, College of Technology, 6.30 p.m. Sound film by I.C.I. Film Unit: "The Discovery of a New Pigment."

Institute of Metals (Sheffield). Grand Hotel, 6.30 p.m. W. H. Whymper: "Casting and Fabrication of Aluminium Alloys."

Royal Statistical Society (Sheffield). The University, 6.30 p.m. E. C. Fieller: "The Activities of the Mathematics Division of the National Physical Laboratory."

Pharmaceutical Society of Great Britain. 17 Bloomsbury Square, W.C.1, 7.30 p.m. C. H. Hampshire: "The British Pharmacopoeia, 1948."

FRIDAY, OCTOBER 29

Association of British Chemical Manufacturers, in conjunction with the Royal Society for the Prevention of Accidents. Grand Hotel, Harrogate. Safety conference (until October 31). Opening address by Sir Ewart Smith, of Imperial Chemical Industries, Ltd.

Royal Institute of Chemistry (London and South-Eastern Counties Section). Cambridge University, 8.15 p.m. Sir Charles Goodeve: "The Physical Chemistry in Iron and Steel Processes."

Sir John Cass Technical Institute (Department of Chemistry). Jewry Street, Aldgate, E.C.3, 6 p.m. First of a series of eight lectures on materials of construction used in chemical engineering. I. G. S. Shipley: "Stoneware and the Ceramics."

The Chemical Society (Glasgow). Joint meeting with the Andersonian Chemical Society and Glasgow University Alchemists' Club, Royal Technical College, 3.45 p.m. Prof. John Read: "Chemical Personalities a Century Ago."

The Chemical Society (Newcastle and Durham). King's College, Newcastle-on-Tyne, 5 p.m. Bedson Club lecture. Prof. Wilson Baker: "Recent Work on Systems of Aromatic Type."

Oil and Colour Chemists' Association (Manchester). Grand Hotel: Dinner and dance.

Royal Statistical Society (Birmingham). Chamber of Commerce, New Street, 6.30 p.m. C. Wainwright: "Statistical Principles in Quality Specification for Plastics."

Problems of Detergency.—Many examples of cleaning materials and a large range of insecticides will be displayed by Shell Chemicals, Ltd., on stands 168 and 169 in the National Hall gallery, Olympia, at the Public Health and Municipal Engineering Congress and Exhibition next month. A new insecticide to be displayed is a "tip dressing" used for control of insect pests in refuse dumps.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Receivership

LEE TEMPLE & CO., LTD., 15/17 Broad Street, Nottingham. (R., 23/10/48.) Mr. Louis W. Euler, C.A., 18 Low Pavement, Nottingham, was appointed receiver and manager on September 15, 1948, under powers contained in debenture dated April 9, 1945.

Company Winding Up Voluntarily

BRITISH AROMATICS, LTD., Manchester, and Ellesmere Port. (C.W.U.V., 23/10/48.) The voluntary liquidation of the company and the appointment of Mr. E. C. Smith, F.C.A., and Mr. R. F. Bendall, F.C.A., as joint liquidators, with five representatives of creditor companies, was confirmed at a creditors' meeting in Manchester, October 5.

Company News

The address of **Silicon (Organic) Developments, Ltd.,** has been changed from 11 Cavendish Place, W.1, to Claver House, Wells Park Road, Sydenham, S.E.26.

The nominal capital of **Marshall Paints, Ltd.,** 186 Talbot Road, Blackpool, has been increased beyond the registered capital of £2000 to £10,000 in 3000 ordinary and 5000 cumulative preference shares of £1 each.

The nominal capital of **Petrocarbon, Ltd.,** River Plate House, 12/13 South Place, E.C.2, has been increased beyond the registered capital of £82,500 to £83,500, in 1s. ordinary shares.

New Companies Registered

Robert H. Ray Company, Ltd. (459,874).—Public company. Capital £3000. Directors: R. H. Ray and J. C. Pollard. Reg. office: 3 Frederick's Place, Old Jewry, E.C.2.

Afkaps, Ltd. (459,785).—Private company. Capital £5000. Manufacturing, analytical and consulting chemists. Subscribers: G. K. Ireland and L. Cork, 20 Copthall Avenue, E.C.2.

Polychemia (London), Ltd. (459,917).—Private company. Capital £100. Manufacturers of chemicals. Subscribers: Eileen Hawtin, Rosa Rosen. Reg. office: 203 Regent Street, W.1.

Goldmaster Industries Ltd. (459,941).—Private company. Capital £100. Manufacturers of plastics, rubber, latex, alloys and chemical compounds. Directors: L. Kirsch and O. Boehringer. Reg. office: 299 Upper Street, Islington, N.1.

S. C. Goodman, Ltd. (459,526).—Private company. Capital £500. Dealers in oils, petrol and chemical materials. Directors: S. C. Goodman (permanent) and Mrs. N. A. Goodman. Reg. office: Sutherland House, 29 Brighton Road, Sutton, Surrey.

Greedens, Ltd. (459,800).—Private company. Capital £1000. Manufacturers, importers and exporters of chemical or medical products. Directors: C. J. Asmussen and J. T. Rutherford. Reg. office: 18 Station Street, Walsall, Staffs.

Hector Products, Ltd. (459,946).—Private company. Capital £50,000. Dealers in all types of products obtained from whales. Subscribers: S. Stevenson and H. C. Hopkins. Reg. office: Moores Carson & Watson, 4 St. Mary Axe, E.C.3.

Better Limes Company, Ltd. (459,894).—Private company. Capital: £2000. Suppliers of limes, manures and fertilisers. Directors: E. H. Fotherby, J. E. N. Brough, E. C. Prosser, J. R. E. MacEachin. Reg. office: Central Chambers, Otley Street, Skipton, Yorks.

Townson Tankers, Ltd. (459,833).—Private company. Capital £5000. Manufacturers of storage tanks, port installations, etc. Directors: J. L. Townson and Mrs. E. V. Townson, both of 9 Huddersfield Road, Oldham. Reg. office: 9 Huddersfield Road, Oldham.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets has been more active, largely owing to the new speculation in iron and steel shares, which reflected more hopeful views of compensation in the event of nationalisation. British Funds came in for profit-taking, following their recent rise, while earlier in the week buyers were awaiting issue terms of the British Electricity Authority's new loan. Transport 3 per cent stock receded and changed hands slightly below par, but later turned firmer, the lower price attracting buyers. Business in the industrial sections has been selective, and in most cases chemicals and kindred shares were well maintained.

Imperial Chemical have changed hands around 47s. with the new shares (20s. paid) at the new high level of 27s. Laporte Chemicals 5s. ordinary were 20s. 9d., Amber Chemicals 2s. shares 9s. 6d., Albright & Wilson 5s. ordinary 29s., while Monsanto Chemicals held their recent rise to 60s.

Buying of iron and steel shares has reflected the view that the value of assets

(estimated by arbitration as in the case of the colliery companies) and not the market value of shares, is likely to be the basis of nationalisation compensation. Share values cannot be taken as the basis, it is argued, because dividend limitation has kept recent dividends down to last year's rates. In the past many companies have had to face capital reorganisations in difficult times and consequently, in some instances existing issued capital now bears little relation to the value of assets or to earning capacity, particularly now that steel production is at its peak level.

Despite considerable profit-taking Dorman Long at 34s. 6d. have risen well on balance for the week, while Colvilles were 38s. 6d., Stewarts & Lloyds 58s. 9d., and Guest Keen 49s. 3d. United Steel at 31s. 6d. were well up on balance, despite a good deal of profit-taking following news of the past year's big profit increase. Sheepbridge rose to 74s. on the assets segregation scheme. Staveley rose further to 94s.

Buying of Borax Consolidated was in evidence on the view that the company's American business and investments are yielding a bigger return; and the shares improved further to 62s. It is realised, however, that dividend limitation will prevent an increase in the company's distribution to shareholders at this stage. United Molasses have been steady at 47s. 7½d., and Lever & Unilever better at 50s. 3d. on the Anglo-Dutch taxation agreement. British Aluminium kept steady at 47s. 6d., and Metal Box shares changed hands slightly over £5. In other directions, British Match eased further to 33s. 9d. on fears of a moderate reduction in the forthcoming interim dividend.

Turner & Newall have been firm at 77s. 6d., with Triplex Glass favoured up to 24s. 6d., while British Plaster Board at 25s. reflected the better tendency in the building group, and Associated Cement strengthened to 73s. 9d. The big rise in profits helped British Celanese 10s. shares, which improved to 21s., although the dividend is unchanged at 8 per cent. Courtaulds firmed up to 39s. 6d.

Elsewhere, Boots Drug at 54s. 3d. were better, British Drug 5s. shares were 9s. 9d., Timothy Whites 38s., Sangers 31s., and Beechams deferred 18s. 4½d. Among shares connected with plastics, Erinoid were firmer following the dividend, but Catalin receded to 6s. on the decision not to make an interim payment. De La Rue were steadier at 39s. 9d. British Glues & Chemicals 4s. shares at 10s. 9d. were within 3d. of the level a week ago. Oils have strengthened after earlier uncertainty. Shell improved to 76s. 10½d. on the big 250 million dollar financing scheme for Caribbean Petroleum, the Shell Royal-Dutch subsidiary. Trinidad Leaseholds at 52s. rose further in anticipation of the results showing a further increase in profits, although dividend limitation will keep the distribution down to last year's rate.

British Chemical Prices

Market Reports

THERE has been little of fresh interest reported on the industrial chemicals market during the past week. The movement to the main consuming industries has been on a substantial scale and in some directions the intake would be greater if the supply position permitted. Inquiries for shipment have also been numerous and the volume of actual export orders placed is thought to be not less than the average for recent weeks. In the soda products section there is a good demand for caustic soda, chlorate of soda, soda ash and bicarbonate of soda, and a steady inquiry is reported for hyposulphite of soda and for the phosphates. Formaldehyde is a good market at firm prices. The call for white lead and red lead continues strong at the higher price levels. Although supplies of cresylic acid are now easier, and the supply position of other coal-tar products is a little less tight, the market remains active with a good home demand at firm values. Export business in pitch and the creosote oils has been satisfactory.

MANCHESTER.—There has been no lack of inquiry on the Manchester chemical market during the past week from home users, merchants and shippers, and actual buying has been on steady lines with prices firm in virtually all sections. The call for actual deliveries of the general run of alkali products and other regular lines has been fully maintained compared with recent weeks and in several sections manufacturers are not finding it easy to meet requirements. Potash, ammonia and magnesia products are in good request. Most of the fertiliser materials are moving steadily to the consuming end, considering the time of the year, and a steady trade continues to be reported in the tar products.

GLASGOW.—In the Scottish chemical market conditions at present are very satisfactory and the volume of business during recent weeks has been higher than for some time. It appears that the increased activity is likely to be maintained. In the export market conditions have also been very satisfactory, and, in general, more orders have been received than heretofore. General comments of overseas buyers on prices and deliveries have been reasonably favourable.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2. at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Distilling hydrocarbon tar and like oils and apparatus therefor.—J. P. Loumiet. May 25, 1944. 608,595.

Hydrocarbon copolymers.—J. C. Arnold. (Standard Oil Development Co.) Aug. 2, 1945. 608,665.

Production of cyclohexane from hydrocarbon mixtures.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, and C. B. Collis. Aug. 9, 1945. 608,605.

Recovery by distillation of cyclohexane from hydrocarbon mixtures.—Anglo-Iranian Oil Co., Ltd., S. F. Birch, and C. B. Collis. Aug. 9, 1945. 608,606.

Concentrating or dehydration of pharmaceutical and other liquids.—Radio Corporation of America. Oct. 3, 1944. 608,611.

Manufacture of ammonium nitrate.—Union Chimique Belge Soc. Anon. June 22, 1943. 608,612.

Polymerisation of vinyl compounds.—A. Boake, Roberts & Co., Ltd., and B. T. D. Sully. April 11, 1946. 608,635.

Process for rendering fibrous cellulosic substances, and articles made therefrom, fireproof.—Gyproc Products, Ltd., and C. G. F. Cavadino. Dec. 13, 1945. 608,668.

Plant for the production and heating of compressed air such as blast furnace air.—Für Technische Studien A.G. Feb. 22, 1945. 608,304.

Production of cellulose esters.—British Celanese, Ltd. March 2, 1945. 608,310.

Air-conditioning, cleansing, humidifying, disinfecting or deodorising apparatus.—B. Lipton. Feb. 20, 1946. 608,330.

Production of cured ethylene polymers.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,333.

Process for the production of coloured artificial fibres and the like from normally solid ethylene polymers.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,334.

Process for improving the properties of nylon fibres.—E. I. Du Pont de Nemours & Co. Feb. 20, 1945. 608,335.

Production of granules from compositions containing water-soluble sulphates.—I.C.I., Ltd., S. Fordham, and J. Taylor. Feb. 20, 1946. 608,336.

Shrinkage control of textiles and textile-forming materials.—American Cyanamid Co. March 9, 1945. 608,372.

Device for uniformly heating a liquid.—H. Glasbeek, Junr. Oct. 6, 1942. 608,376.

Preparation of asphaltic bitumen compositions.—N.V. de Bataafsche Petroleum Maatschappij. Nov. 3, 1942. 608,394.

Curing of polymeric materials.—E. I. Du Pont de Nemours & Co. Feb. 22, 1945. 608,414.

Treatment of dross.—National Smelting Co., Ltd. March 27, 1945. 608,442.

Multi-coloured synthetic gems and process for making the same.—Linde Air Products Co. March 17, 1945. 608,453.

Liquid fuel controlling means.—J. Lucas, Ltd., and R. J. Ifield. Feb. 25, 1946. 608,461.

Production and use of alkaline vegetable protein solutions.—Courtaulds, Ltd., A. F. Millidge, and C. L. Knight. Feb. 25, 1946. 608,464.

Purification and clarification of liquids.—L. J. Derham. Feb. 25, 1946. 608,468.

Preparation of anhydrous normally-liquid ethers for use more particularly in the production of silicone intermediates.—Metropolitan-Vickers Electrical Co., Ltd., W. K. Buchanan, and W. Simpson. Feb. 25, 1946. 608,478.

Preparation of derivatives of cholesterol.—Glaxo Laboratories, Ltd., E. R. H. Jones, A. E. Bide, and R. J. Nicholls. Feb. 25, 1946. 608,482.

Cation-exchange resins.—Permutit Co., Ltd., T. R. E. Kressman, and L. E. Holmes. Feb. 25, 1946. 608,516.

Production of azo-dyestuff images from asymmetrical N-aryl hydrazine photographic developers.—General Aniline & Film Corporation. Feb. 24, 1945. 608,520.

Apparatus for the administration of inhalant gas mixtures.—British Oxygen Co., Ltd., and W. Jones. Feb. 26, 1946. 608,536.

Conversion products of 2 : 3 dihydropyran.—I.C.I., Ltd., and J. G. M. Bremner. Feb. 26, 1946. 608,538.

Process for the oxidation of cyclic ethers.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Feb. 26, 1946. 608,539.

Production of tetrahydrofurfuryl alcohol.—I.C.I., td., F. Starkey, and J. G. M. Bremner. Feb. 26, 1946. 608,540.

Basic refractory products, in particular basic refractory linings for furnaces, and parts of furnaces, and process for obtaining same.—Commentry, Fourchambault et Decazeville. Oct. 31, 1941. 608,544.

Bleaching cellulosic textiles.—Mathieson Alkali Works. May 16, 1945. 608,547.

Polymerisation of coumarone and indene.—J. Wilkinson & Son, Ltd., and R. Y. Eagers. Feb. 26, 1946. 608,548.

Coating composition.—W. H. Hoist, and G. R. Hersam. Sept. 23, 1944. 608,654.

Preparation of catalysts.—I.C.I., Ltd., J. G. M. Bremner and S. Beaumont. Feb. 27, 1946. 608,697.

Treatment of tetrahydrofurfuryl alcohol.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. Feb. 27, 1946. 608,565.

Manufacture of highly polymeric carbamates.—I.C.I., Ltd., J. W. Batty, and H. P. W. Huggill. Feb. 27, 1946. 608,698.

Manufacture of aerating powders and calcium pyrophosphate compounds.—A. Bird & Sons, Ltd., and R. Russishvili. Feb. 28, 1946. 608,708.

Insecticidal compositions.—Ashe Laboratories, Ltd., and M. D. Price. Feb. 28, 1946. 608,715.

Coloured fluorescent materials and articles.—British Celanese, Ltd. March 1, 1945. 608,725.

Continuous electrode furnaces.—Det Norske A/B for Elektrokemisk Industri. March 3, 1945. 608,656.

Apparatus for delivering measured quantities of liquids.—Theo & Co., Ltd., and D. Smith. March 28, 1946. 608,570, 608,571.

Production of insulating materials.—British Celanese, Ltd. Feb. 3, 1943. 608,753.

Manufacture of N-substituted imino-difatty acid amides.—J. R. Geigy A.G. May 13, 1943. 608,935.

Cutting and embossing machinery for plastic sheet material.—T. & T. Vicars, Ltd., and J. F. Naylor. July 26, 1944. 608,848.

Diluents and coating compositions containing such diluents.—Heresite & Chemical Co. Oct. 18, 1943. 609,027.

Production of organic nitrogen compounds.—I.C.I., Ltd., and C. W. Scaife, and H. Baldock. [Legal representative of H. Baldock (deceased).] Dec. 11, 1944. 608,758.

Resin products and preparation thereof.—Borden Co. Nov. 30, 1943. 608,940.

Process for refining the grain of magnesium base alloys.—Magnesium Elektron, Ltd., and F. A. Fox. Dec. 29, 1944. 608,941.

Process for refining the grain of magnesium base alloys.—Magnesium Elektron, Ltd. (Basic Magnesium Inc.) Dec. 29, 1944. 608,942.

Modification of hydrocarbon materials, more especially liquid hydrocarbon lubricants.—J. C. Arnold. (Standard Oil Development Co.) Jan. 17, 1945. 608,854.

Production of magnesium base alloys.—Magnesium Elektron, Ltd. (Basic Magnesium Inc.) March 6, 1945. 608,945.

Alloy.—J. C. Arnold. (Coast Metals, Inc.) March 9, 1945. 608,858.

CLASSIFIED ADVERTISEMENTS

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EXAMINATION, 1949

Application forms (returnable 1st December, 1948) and particulars of the Associate-Membership Examination for 1949 may be obtained from the HON. REGISTRAR, Institution of Chemical Engineers, 56, Victoria Street, Westminster, London, S.W.1.

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None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

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